British Columbia

Seafood Sector and Tidal Water Recreational Fishing:

A Strengths, Weaknesses, Opportunities, and Threats Assessment

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Final Report

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Summary

This report summarizes the findings of a comprehensive study commissioned by the Province of British Columbia to assess the strengths, weaknesses, opportunities, and threats (so-called "SWOT analysis") of the BC seafood and tidal recreational fishing sectors. The seafood sector comprises three subsectors: the capture (or wild) fishery, the aquaculture (or farmed) industry, and the processing and marketing of capture and aquaculture products.

I. INTRODUCTION

British Columbia offers many advantages for seafood production and tidal recreational fishing. These include a relatively healthy wild fish and shellfish resource, large nearshore and foreshore areas with very good biophysical capability for seafood culture, and a comparatively pristine natural environment to attract anglers. At the same time, global seafood consumption is rising, spurred by higher incomes and health concerns, while outdoor recreation has emerged as one of North America's fastest growing tourism activities.

Despite these advantages, BC's seafood sector and tidal recreational fishery have witnessed fundamental and unprecedented change since the early 1990s. Shifting oceanographic conditions have led to lower productivity and fewer fish. The Canadian regulatory and policy regime has altered substantially with the move to stronger property rights in fisheries management, adoption of the precautionary approach, and introduction of the Aboriginal Fisheries Strategy (AFS) and the *Canadian Environmental Assessment Act* (CEAA).

Other challenges, as well as opportunities, have resulted from globalization, the opening up of trade, greater capital mobility, and technological advances in transportation and other services. The seafood and recreational fishing sectors face various constraints – from a lack of industry cohesion in some subsectors to inflexible government regulation to inadequate attention to consumer needs – that hinder adaptation to the new global business conditions. There is both a compelling need and substantial potential for industry and government to re-orient these sectors to significantly enhance their long-term financial viability.

This study is designed to provide an information base on the seafood and recreational fishing industries to support provincial strategic planning. Its content will also be of interest to industry, the Government of Canada including the Department of Fisheries and Oceans (DFO), First Nations, and others.

A variety of important business issues are examined in the study including markets, government policies and regulations, the fisheries resource, labour and training, investment, environmental issues, and industry cooperation. Each sector is profiled and treated consistently in terms of its contribution to the provincial economy. The study can serve as the basis for cooperation among the sectors.

For the SWOT analysis, an extensive research program was conducted, including interviews with 180 individuals, reviews of more than 100 reports and publications, surveys on international seafood markets and Queen Charlotte Islands fishing lodges, numerous case studies, and analyses of economic and statistical information.

II. INDUSTRY PROFILE

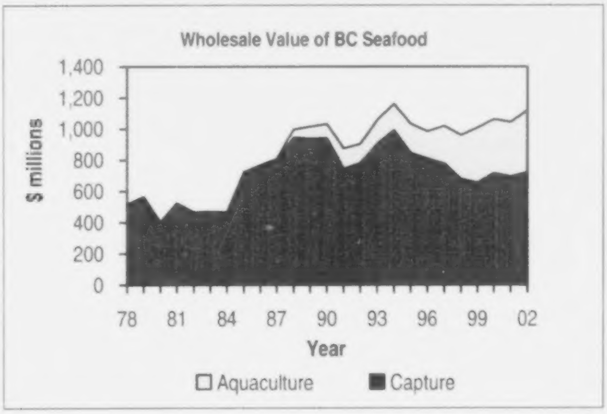
In 2002, the BC seafood and tidal recreational fishing sectors together directly generated $1,865 million in sales, $960 million in gross domestic product (GDP), $575 million in wages, and 16,560 person-years (PYs) of employment from more than 30,000 full-time and seasonal jobs.

	BC Economic Activity 2002		
	Seafood	Tidal Angling	Total
Sales Value ($ millions)	$1,315	$550	$1,865
Wages & Benefits ($ millions)	$450	$125	$575
Gross Domestic Product ($millions)	$750	$210	$960
Employment (PYs)	12,970	3,590	16,560

A. Seafood

The capture harvesting sector utilizes approximately 3,000 vessels to fish about 200,000 tonnes of fish from four main species groups: salmon (five species), herring and pelagics, groundfish (e.g., halibut, sablefish, rockfish, sole), and a variety of shellfish and invertebrates (e.g., crab, prawns, geoducks).

The aquaculture sector farms finfish (primarily salmon) and shellfish (mostly oysters and clams) on about 420 active sites, consisting of 80 finfish (on 121 licensed sites on 1,191 hectares) and 340 shellfish (on 455 licensed sites on 2,727 hectares) sites. The processing sector transforms the raw food material from fishermen and growers into a variety of processed products.

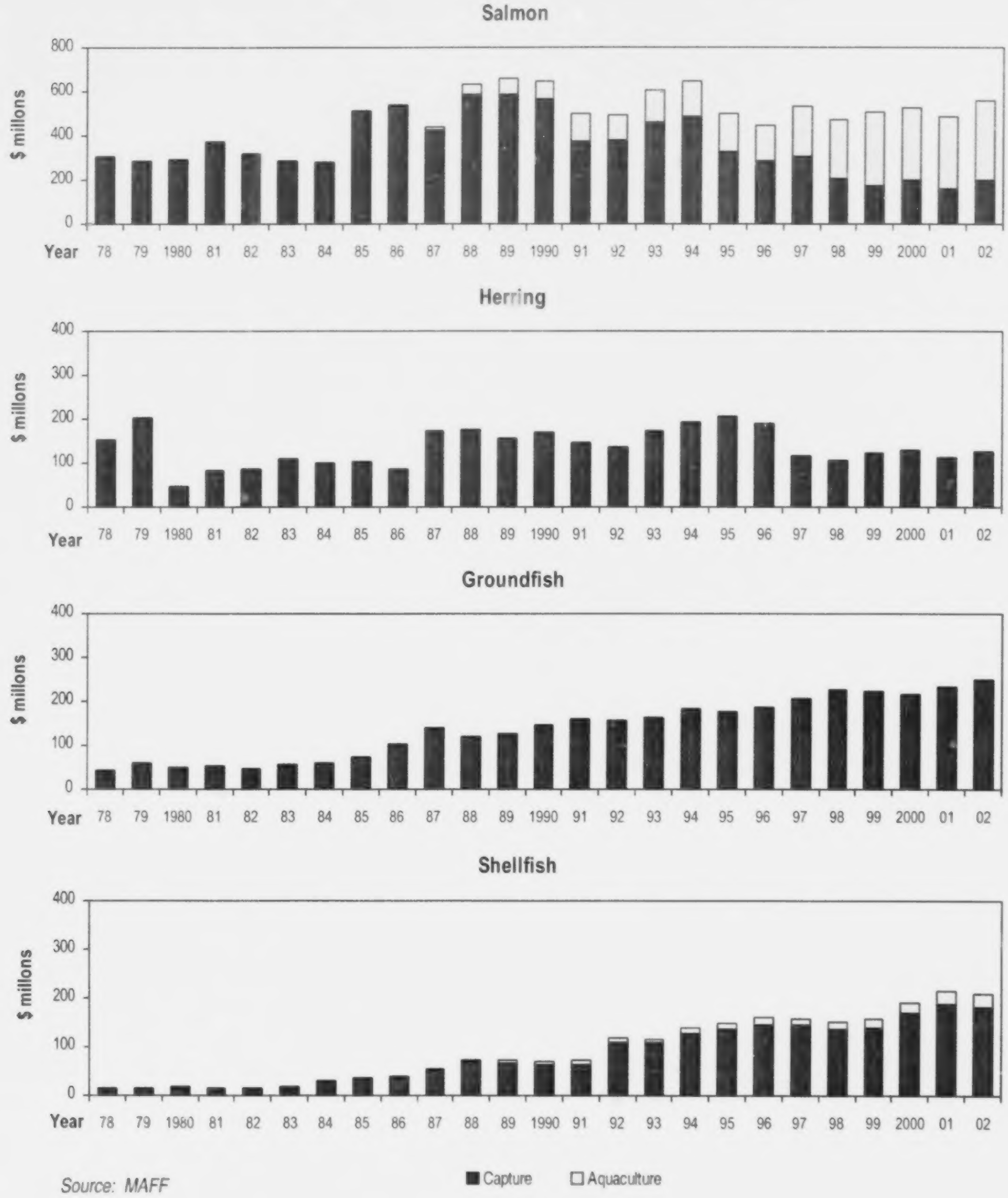


The seafood industry grew throughout the 1980s, achieving wholesale revenues of $1 billion in 1989. However, growth has since levelled off, with an industry wholesale value of $1,148 million in 2002. Adding retail and distribution margins results in an estimated total BC sales value of $1,315 million. (Another $125 million in distribution margin is generated in the rest of Canada.)

Different subsectors have shown different trends over the past 15 years (see Exhibit S-1), including:

- a substantial decline in landed values for wild salmon and herring, and an increase in landed values for wild groundfish and shellfish;
- a large increase in salmon farmgate value, but a more modest increase in shellfish farmgate value; and
- a transformation of the seafood industry with production shifting out of canned, frozen whole, and roe products (traditional salmon and herring products) and into fresh whole, live, and value-added fillet products in the aquaculture, groundfish, and shellfish sectors.

Exhibit S-1: Wholesale Value of BC Seafood by Species Group



Source: MAFF

BC seafood is largely an export-oriented industry. Since 1990, there has been growth in sales to the United States, the principal market for farmed salmon, while sales to Japan and the United Kingdom, traditional markets for wild (capture) salmon, have declined. Today, the US market comprises more than 60% of total provincial exports.

	BC Seafood Sector 2002		
	Capture	Aquaculture	Total
Activity			
Harvest/Production (tonnes)	194,300	94,100	288,400
Number of Active Fishing Vessels	3,000	n/a	3,000
Number of Active Growout Sites	n/a	420	420
Number of Active Processing Plants*	167	66	182
BC Sales Value ($ millions)			
Harvesting and Farm Level**	364	304	668
Processing Margin**	396	84	480
Retail and Distribution Margins	110	57	167
Total	870	445	1,315

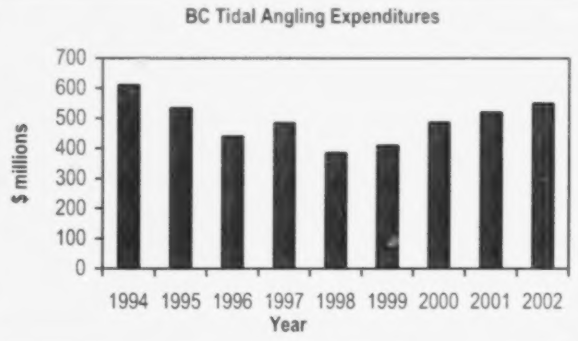
* *51 plants process both capture and farmed products.*

** *Harvesting/farm value plus processing margin equals wholesale value.*

The above figures exclude catch from three types of commercial aboriginal fisheries – Pilot Sales Agreements under the Aboriginal Fisheries Strategy, Excess to Salmon Spawning Requirements (ESSR) surpluses, and Nisga'a Treaty entitlements. The total catches in these fisheries averaged approximately 0.5 million sockeye (16% of the regular commercial catch) and 0.5 million other salmon (8% of the regular commercial catch) annually over the 2000-2002 period.

B. Tidal Angling

Anglers may rely on a range of fishing lodges and charters to enhance their experience, or they may fish recreationally on their own. Salmon is the primary target species, mainly chinook, but other salmon species, halibut, rockfish, and other fish and shellfish are also important. Angling licence sales declined in the mid-1990s but have remained relatively stable at over 300,000 annually over the past five years. Angler expenditures peaked in 1994, fell throughout the 1990s, and then recently rebounded to $550 million in 2002.


BC Tidal Angling Expenditures

	BC Tidal Angling 2002
Activity	
Angling Licences*	333,800
Angler-Days	2,100,000
Number of Lodges	125
Number of Charters	500
Angler Expenditures ($ millions)	
At Lodges	120
At Charters	30
Other	400
Total	550

** includes 53,700 to children under 16 years*

C. Regional Employment

Total BC employment in the seafood and tidal recreational fishery sectors is estimated at 16,560 person-years (PYs) for 2002. This total is comprised of 12,970 PYs in the seafood sector (harvesting/growout plus processing and distribution) and 3,590 PYs in the recreational sector. The actual number of jobs is close to 30,000, since much of the capture harvesting and processing, as well as recreational fishing employment is seasonal. In contrast, most salmon aquaculture jobs, on farms and in processing plants, are year-round.

	2002 Employment (PYs)		
	Seafood	**Recreational**	**Total**
Harvesting/Growout	5,140	n/a	5,140
Processing	5,690	n/a	5,690
Retail and Distribution	2,140	3,590	5,760
	12,970	3,590	16,560

The seafood sector and recreational fishery provide 55% of their total job benefits in rural communities outside the major metropolitan areas of Greater Vancouver and Greater Victoria (Exhibit S-2). The aboriginal share of total employment is about 20% overall, amounting to over 6,000 jobs and 3,000 PYs of employment.

Exhibit S-2: 2002 BC Seafood & Tidal Recreational Fishing Employment (Person-Years)

	Seafood			Tidal Recreational	Total
	Capture	Aquaculture	Subtotal		
Region					
Queen Charlotte Islands	105	0	105	100	205
North Coast	1,000	0	1,000	220	1,220
Central Coast	115	60	175	65	240
North Vancouver Island	335	1,150	1,485	210	1,695
Mid Vancouver Island	855	1,330	2,185	615	2,800
South Vancouver Island	570	95	665	255	920
West Coast Vancouver Island	440	400	840	490	1,330
Victoria and Area	455	75	530	415	945
Sunshine Coast	265	165	430	110	540
Lower Mainland and Other	4,705	850	5,555	1,110	6,665
Total	8,845	4,125	12,970	3,590	16,560

Note: 1. Estimates are approximations.

2. Employment is the sum of harvesting/farming, processing, retail, and distribution.

3. PYs are person-years.

4. Region is place of residence and not necessarily the location where the activity occurs.

Source: GSGislason & Associates Ltd. estimates.

III. THEMES

During the study interviews and investigations, several themes recurred with respect to the challenges and opportunities facing the BC seafood and tidal recreational fishing sectors. These themes are outlined below, along with some sample comments from the interviews and research. (The themes are not prioritized.)

A. General

Theme #1: **The world has changed and the BC seafood and recreational fishing sectors need to change with it. By adapting, industry can prosper; otherwise it will wither and fail to reach its potential.**

The late 1970s through the early 1990s were a good period for the BC seafood industry, characterized by: 1) favourable oceanographic conditions; 2) exclusive access to existing stocks within Canada's 200 nautical mile Exclusive Economic Zone, declared in 1977; 3) favourable exchange rate movements; 4) growing world economies, especially in Japan; and 5) strong global demand and prices for seafood. The BC recreational fishery was also able to expand to the next resource frontier: the West Coast of Vancouver Island, the Queen Charlotte Islands, and the North Coast.

These favourable conditions have since disappeared or reached maturity. The world aquaculture sector has grown dramatically over the past 20 years, greatly increasing the global supply of seafood and affecting world seafood markets. Successful businesses and industries are those that can adapt and reposition themselves in the face of changing circumstances. Both the seafood and recreational fishing sectors must do so in order to respond to new challenges and opportunities.

Sample comment: *Product differentiation is key; anybody in the commodity business is dead.*

Theme #2: **Leadership, accountability, and relationship and trust building are essential, within and between industry and government.**

The modern food industry requires coordination between the different levels of the value chain to meet the needs of final consumers. Harvesters/growers, processors, distributors, and retailers must cooperate to satisfy the availability, quality, and price parameters of individual market segments.

Given the importance of government regulation to industry fortunes, there is also a need for productive dialogue between industry and government. This would be much facilitated by an effective industry association speaking with one voice for each major sector, and by government departments viewing economic considerations as part of their mandate and service delivery.

Sample comment: *Risk and uncertainty are inherent parts of any business. We need people to make decisions and to take responsibility for their decisions.*

Theme #3: **Aboriginal issues, including land claims, create substantial uncertainty and business risk and stifle needed investment.**

Claims settlements would reduce uncertainty with respect to Crown land tenure for aquaculture and tourism businesses and with respect to licence policy, allocation, and security of resource access for both the capture and recreational fisheries. Settlements could also stimulate business opportunities for both aboriginal and non-aboriginal interests.

Sample comment: *To compete you need to invest. Existing industry is not investing in its future.*

Theme #4: **The whole is larger than the sum of its parts. Each sector has a legitimate claim to existence; sector bashing gives mixed messages.**

There is broad public support for the BC seafood and recreational fishing sectors, as evidenced by the substantial numbers of Canadians who eat BC seafood and/or fish recreationally in BC. However, in recent years, the public increasingly views fish and fishing as environmental issues or the subject of fractious controversy, instead of the foundation of a food business and of an outdoor recreation activity.

The controversies have resulted in several false assertions, dampened demand in some markets, and sent government mixed signals as to needed regulatory action (resulting in government inaction on several fronts). They have also wasted the attention of industry senior management and stalled industry strategic planning at a time when the competitive landscape is shifting rapidly.

Sample comment: *For your individual sector to be healthy, you need all sectors to be viable.*

Theme #5: **The environmental ethic is growing worldwide, with major implications for the capture fishery and aquaculture.**

This change is evidenced by the Marine Stewardship Council (MSC) certification process for sustainable seafood and the growing influence of environmental organizations on fisheries management decisions.

Environmental sustainability requirements affect both supply and demand. Without demonstrable sustainability, the BC capture and recreational fisheries and the aquaculture industry will not be allowed to operate, or will have their operation severely limited. Buyers, increasingly, are instituting sustainable sourcing policies for seafood, particularly in Europe. For seafood and recreational fishing sectors to be sustainable economically, they must be sustainable environmentally.

Sample comment: *Consumers are asking more questions as to where and how the fish are caught.*

Theme #6: **The federal Species at Risk Act (SARA) will have a major impact on particular fisheries.**

The protection of wild species under SARA may seriously impact capture fisheries through closures and other restrictions where endangered stocks are mixed with strong stocks. In particular, the Johnstone Strait and Juan de Fuca Strait sockeye fisheries may face severe restrictions to protect Cultus Lake sockeye and Sakinaw Lake sockeye.

Sample comment: *Industry should not underestimate how profound the fisheries management changes will be under SARA.*

Theme #7: **Government regulation of the BC seafood and recreational fishing sectors is considerable, as it should be. At the same time, regulation and policy actions should be efficient, timely and prudent so as not to inhibit business planning and operations.**

Government has an important regulatory role given industry use of the public marine environment and human health and safety issues. However, private sector businesses need to plan operations, raise capital and financing, develop markets and products, and invest in research and development and human resources. To a significant extent, the tardiness and perceived capriciousness of government decisions inhibits these essential business operations.

Sample comment: *Preservationist-thinking overtook DFO in the late 1990s. Industry can live with bad decisions, but it cannot live with no decisions.*

Theme #8: **Government must focus on what needs to be done rather than on who should do it. Although the federal government has paramount regulatory responsibility for fish harvesting and tidal angling, the Province can still play an important role.**

It is important first to identify which actions and policy initiatives are advisable and then to decide cooperatively who should lead the action or initiative. There is a need to coordinate and harmonize federal and provincial requirements and actions.

The Province can and should influence the federal government on a variety of business issues, including the need for management reform of the capture fishery to improve industry viability and to pursue market opportunities, and the requirement for much better marketing of both seafood and recreational fishing opportunities.

Sample comment: *We need to stop looking at fisheries and their problems from a jurisdictional perspective.*

B. Seafood Sector

Theme #9: **BC seafood competes in the global food industry. The seafood sector faces much greater competition from globalization and the growth of aquaculture.**

BC seafood products must compete with seafood from other countries and with other protein sources, such as poultry, pork, and even soy. The seafood industry should emphasize the "food" component of "seafood".

Advances in refrigeration and transportation technology mean that seafood processing no longer needs to occur in close proximity to the growing or harvesting location. Substantial consolidation in food distribution and retailing has put price pressures on food manufacturers and their suppliers. Formal tariffs have decreased on many food items with several international trade agreements. The result is greater competition.

Sample comment: *We need to impose the discipline of food manufacturing on the seafood sector.*

Theme #10: **Consumer tastes and preferences are changing. BC needs to adapt to the demands of the market and meet customer needs, rather than focussing on the resource. Industry must be market-driven instead of production-driven.**

Among consumer trends are greater attention to a healthy diet, which includes seafood and a desire for more convenience in food products (e.g., "meal-ready" products). More people are eating in food service restaurants.

Seafood today is a "buyers market", not a "sellers market". The key to success in most businesses is to understand customers' needs, shape product offerings so that they match those needs, and aggressively market the products to potential customers. Most businesses succeed based on marketing prowess and not on production capability.

Sample comment: *Marketing is an aggressive blood sport. We need to get much better at it.*

Theme #11: **Competing in the global food business requires cooperation throughout the value chain to meet consumer needs.**

Customers expect and demand a consistent supply of good quality, nutritious food at a competitive price throughout the year. Meeting these needs requires communication, cooperation, and coordination of the different players in the value chain.

For example, at an arranged time a known number and weight of live poultry will be delivered to the poultry processing plant, where the birds are slaughtered, bled, processed, graded, and packaged into a variety of consumer products. These products then move through distribution channels to fill pre-specified retail and food service orders. This is the business model against which the seafood industry competes.

Sample comment: *In the food business, you need cooperation between production, processing, and marketing. You need single messaging from industry to government.*

Theme #12: **As a high-cost, low-volume producer, BC must press its advantage in quality. Quality means different things to producers and consumers.**

The province and Canada as a whole have relatively high wage rates, and more stringent environmental and health and safety standards than most of their international competitors. Consequently, their production costs are higher. In low-value, labour-intensive commodity markets, BC has difficulty competing.

BC's potential advantage in seafood – both capture and farmed – is the high quality of the food product when it leaves the cold, relatively pristine marine environment. The nearshore fishing fleet and the farmed finfish and shellfish sectors can provide high quality products to major markets in the US and Southeast Asia in a timely manner.

For many seafood producers, quality is synonymous with meeting regulatory standards on health and safety, such as Hazard Analysis and Critical Control Point (HACCP) standards, to ensure that the seafood is safe to eat. Customers, however, see safety as a minimum requirement, with true quality entailing a myriad of factors, such as shelf life, taste, appearance, and packaging. The seafood business needs to understand quality from its customers' perspectives and then deliver it. The global aquaculture seafood sector has raised quality expectations for the global capture seafood sector.

Sample comment: *We should be a high-end producer and not a commodity producer. Our cost structure is too high.*

Theme #13: **Traceability is becoming a business requirement.**

Without demonstrable traceability, BC seafood producers will not be able to access an expanding sphere of markets. Traceability is a growing market requirement. For the capture fishery, it is inexorably linked with selective fishing and catch monitoring from "sea to table".

Traceability is difficult, if not impossible, to demonstrate without credible catch monitoring. While inevitably adding to costs, it also creates market and product development opportunities by slowing down the harvest and enhancing the identification of different quality products through the value chain.

Sample comment: *The pressure is on, especially in Europe, to be able to trace a product back to its source – not just the plant, but back to the individual vessel or farm.*

Theme #14: **Human resource issues are pending and require immediate attention.**

By and large, a training culture does not exist in the BC seafood industry. Most training, where it occurs, is on-the-job rather than institutional. The institutional training that does exist focuses on production techniques, rather than marketing and business skills. Some exceptions can be found, for example in the newer farmed salmon processing plants. Institutions in Eastern Canada, the European Union, New Zealand, and many other regions do a better job than BC institutions of training seafood industry workers.

The workforce on BC boats and in processing plants, especially wild fish plants, is aging. Today's vessel and plant operations require knowledge of more sophisticated equipment and electronics. Tomorrow's workers will need improved skills and knowledge to meet emerging sustainability and traceability challenges.

Sample comment: *Our workforce is old. For any job with a skill attached to it, we are in trouble in the wild business.*

Theme #15: **Wild salmon and its problems dominate discussions of the capture fisheries.**

The discussions and analysis during the course of this study suggest that the non-salmon capture fisheries of herring, groundfish, and shellfish are operating reasonably well. They are viable and generally market-driven; their fisheries organizations have strong and constructive relationships with DFO, processors, and others; and there is a degree of trust among individual fishermen, processors/buyers, and DFO.

The BC salmon fishery has none of these characteristics. The four barriers – a lack of viability, an inability to meet market needs, ineffective industry organizations, and insufficient cooperation and trust – are related; they are linked by the inadequacy of the current management regime for salmon. This competitive fishery system does not foster the appropriate incentives, enlightened self-interest, and cooperation needed to operate successfully in the global seafood industry.

Sample comment: *Peoples' perceptions of fisheries are coloured by salmon.*

Theme #16: Both the capture and aquaculture sectors would benefit from cooperating with one another.

The general food consumer is often unsophisticated and susceptible to mixed messages from attack advertising. Many consumers who hear attacks on farmed salmon, for example, will receive the message that it is bad to eat seafood and bad to eat salmon.

The capture and aquaculture sectors could work together to expand the overall market and attract new consumers for all seafood. The farmed finfish sector also has year-round distribution channels for fresh seafood – channels completely different than those for canned, roe, or frozen whole products – that potentially could also be used to market high-quality fresh capture seafood as niche specialty products.

Sample comment: *Distribution systems for fresh farmed salmon could serve as a model for distributing quality wild salmon.*

C. Recreational Sector

Theme #17: Recreational fishing in BC competes with angling opportunities elsewhere and with other forms of outdoor recreation in North America.

Competitors of BC angling include other angling providers, such as Alaska, as well as non-angling alternatives, such as golfing, ecotourism, and other passive recreational pursuits. Our healthy fish stocks and enviable wilderness setting draws anglers from throughout North America and around the world.

Sample comment: *Our corporate lodge client could go to a golf resort next year.*

Theme #18: The lack of attention and financial resources devoted by DFO to the recreational fishery is a major problem.

The lack of profile and resources devoted to the recreational fishing section within DFO inhibits industry planning and recognition. For example, improved catch monitoring for the recreational fishery is needed in today's era of sustainable fisheries and selective fishing practices. However, it is currently hampered by DFO's low commitment to recreational fisheries.

Sample comment: *DFO is so understaffed and underfunded on the recreational fisheries front that it borders on tokenism.*

Theme #19: The recreational sector has weak linkages to the broad tourism sector and tourism marketing programs.

The outdoor recreationist has a multitude of activity options and may combine several activities on a particular trip. Stronger linkages of angler-businesses to broad-based tourism associations such as Tourism BC are warranted to facilitate marketing.

Sample comment: *The recreational fishery should forge closer links to Tourism BC.*

Theme #20: **It is unclear where the next generation of anglers will come from.**

The BC population is increasing but per capita participation in angling is decreasing. Urban populations represent a potential angler pool but the industry needs to promote awareness of and educate the public about angling opportunities.

Sample comment: *There is a huge potential to cultivate and recruit the urban angler, but lack of awareness of opportunities is a problem.*

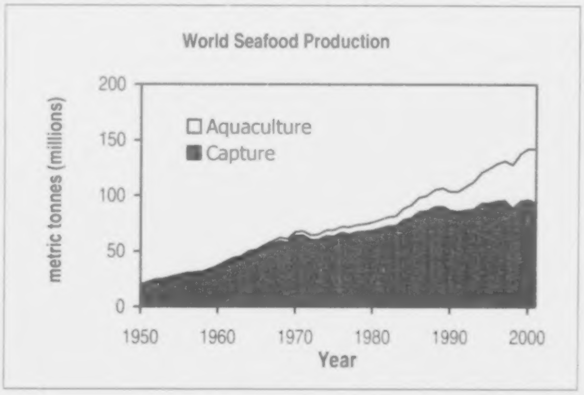
IV. MAJOR BUSINESS ISSUES

A number of major business issues have emerged for BC seafood and tidal angling

A. Market Trends and Requirements

Seafood

World seafood production grew from 100 million tonnes in 1987 to 142 million tonnes in 2001, consisting of 94 million tonnes from the capture fishery and 48 million tonnes from aquaculture. Global production is expected to rise by another 20 to 30 million tonnes by 2020. Essentially, all of the growth since the late 1980s and all projected future growth are attributable to aquaculture.



Seafood is now a global food business, with processing locations no longer necessarily tied to the location of harvest or growing. For example, technological advances and low wages in Southeast Asia (e.g., $1 US per hour in China) make it cost-effective to ship frozen fish to Asia for further processing and then distribution around the world.

Significant consolidation at the food distribution and retail levels has occurred. Large discounters (e.g., Costco) and broadline distributors of a variety of proteins (e.g., SYSCO) have emerged, and the balance of power has shifted from food manufacturers to retailers. The result is now severe price and margin pressure on manufacturers.

There is much greater competition for "centre of the plate" protein among seafood, red meat, poultry, soy, and other products. In the food industry, producers, processors, and distributors cooperate to deliver "consumer value," meaning products that deliver the availability, price, and quality attributes desired by consumers.

Consumer trends include the shift to a more healthy diet, convenience ("meal ready") products, and increased concern about food safety, especially after the BSE ("mad cow" disease) incidents and terrorist attacks. Traceability – the tracking of food from harvesters or growers along the value chain to the final consumer – is increasingly becoming a requirement for market access. Potential European buyers are sending inspectors to BC fish processing plants to gauge procedures.

Seafood consumers generally prefer fresh to frozen seafood. Fresh fish distributors indicate a preference for fresh fish that is bled, with no belly cuts, layer-iced, and delivered no later than 72 hours after slaughter. Bleeding typically doubles shelf-life. While the aquaculture sector can meet these specifications, the wild fishery and processing sector have difficulty doing so. (Farmed salmon production techniques have been modelled after the poultry industry, including the delivery of live animals to the plant, bleeding and other practices.)

Niche markets also exist for live and whole seafood products of the highest quality. Examples include geoducks (Hong Kong) and live oysters and rockfish (specialty restaurants in the Pacific Northwest). The value derives not from cutting and/or processing the product, but rather from handling, refrigeration, packaging, and transport to preserve its pristine quality following harvesting.

Sustainability and eco-labelling are gaining importance as desirable market attributes, particularly with the Marine Stewardship Council (MSC) certification process. Unilever has indicated that by 2005 it will buy only fish from sustainable sources. Alaska salmon is MSC-certified, and BC salmon is currently in the review process. Both BC and Alaska halibut are also in the MSC review process.

The Japanese seafood market, traditionally the most discerning and highest quality, has been transformed with the weakness in Japan's economy, a shift in consumer tastes of younger people away from seafood towards red meat, and the influx of farmed salmon and other seafood. These changes, along with exchange rate movements, have reduced prices for BC salmon and herring roe exports to Japan.

Canadian seafood exporters benefited during the late 1990s from the weak Canadian dollar relative to the US currency. With the dollar's recent strengthening, this advantage has disappeared, since revenues are denominated mainly in US dollars.

Tidal Angling

A total of 2.1 million angler- days were fished in BC in 2002, comprising 1.65 million days of boat-based angling and 0.45 million days of shore-based angling. The vast majority of this activity was conducted by BC residents, who on average fish twice the days of non-residents. Alberta and Washington State are the source of most out-of-province anglers. The shares of anglers fishing from shore and anglers using lodge services have been rising.

Immigration, an aging population, and urbanization have all contributed to reduced angling by BC residents. BC fishing lodges and charters face competition for the outdoor recreationist tourist dollar from other saltwater angling (mainly Alaska), freshwater angling, and other outdoor recreation such as golf and ecotourism.

BC's advantages are relatively healthy fish populations, a pristine marine environment, and low costs. The strengthening Canadian dollar is a challenge to the lodge, charter, and other businesses that cater to US anglers. Increasingly, provincial operators are packaging angling products to diversify their client base.

B. Government Policies and Regulations

Seafood

The main regulatory challenge in the wild harvesting sector is to reform the management of the salmon fishery. There is a strong need to abandon the competitive fishing format and to provide incentives to slow down the harvest so as to realize better quality and value from the fish. A major impediment to change is the lack of an effective salmon harvester association representing the majority of licence holders. Without such an organization, DFO does not know with whom to consult and negotiate.

There is substantial uncertainty of access in harvesting. Uncertain access or tenure is tied to treaty and Aboriginal Fishing Strategy issues, especially the controversial Pilot Sales Agreements under the Aboriginal Fishing Strategy (AFS). However, uncertainty of access relates not only to aboriginal matters.

The fact that fishing licences and/or quotas represent limited fishing privileges and not property rights *per se*, together with the unfettered discretionary authority of the federal Minister of Fisheries and Oceans, means that true certainty of access to the resource is not possible for harvesting. Industry maintains that the lack of certainty shortens the business planning horizon, prevents financing of operations, and diminishes business value.

The aquaculture industry is subject to more than 50 separate federal, provincial, and regional regulatory processes governing land use and development. A key concern is the federal CEAA screening and approval process for new and renewed farm sites. These reviews can take two years or more. The lack of timely approvals stymies industry growth, puts individual companies in dire financial straits, and eliminates employment opportunities for economically disadvantaged coastal communities.

The Codes of Practice for farmed salmon and shellfish operations, developed by industry and the provincial government, will raise standards and performances, comply with applicable laws and regulations, and ensure that farming practices meet objectives for environmental sustainability.

Tidal Angling

The 1999 DFO Salmon Allocation Policy gave the recreational sector priority access over the commercial sector to chinook and coho salmon, and the commercial sector primary access to sockeye, pink, and chum salmon. This policy has helped the recreational sector immensely. Not only has it provided more salmon, but also industry has been able to market the policy as a selling point to prospective clients. Recently, DFO announced a recreational sector 12% catch "ceiling" for the combined commercial-recreational harvest of halibut.

The regulatory uncertainty that presided over the industry in the late 1990s has abated to a large extent. In recent years, DFO has given early signals to the recreational fishing sector that catch limits and angling opportunities should remain stable.

C. Human Resources

Seafood

The workforce of the capture seafood sector, on boats and in plants, is aging and characterized by generally low levels of education and formal training. It does not necessarily have the skills, or the ability to retrain, to meet the demands of today's food industry. Moreover, wage rates in BC fish processing plants are higher than those in East Coast Canadian facilities.

The BC farmed salmon industry does recruit trained and skilled workers to work at the farm site. However, many of these employees come from East Coast institutions (e.g., the Marine Institute in St. John's), since the breadth and duration of aquaculture training at BC institutions does not meet industry needs or standards. The provincial farmed shellfish workforce is mostly untrained. Productivity at shellfish farming sites could be increased substantially with greater worker diligence and knowledge.

Unlike the European seafood sector, BC industry does not have a strong training culture. As market demands shift to increased health and safety, traceable and sustainable production techniques, and new product development, the provincial seafood workforce will become a liability to international competitiveness.

Tidal Angling

Fishing lodges and charters form part of the tourism and hospitality sector. Typical of tourism industries, most lodge and charter businesses train their own workers on the job.

There do not appear to be any serious human resource recruitment or training issues for the recreational fishery. However, some northern operators report difficulty in instilling a service mentality in local hires, with the result that they frequently turn to workers from Vancouver or Victoria to staff field positions. Other operators have established joint ventures with local interests, often aboriginal, and have a substantial number of local hires in their workforce.

D. Investment and Technology

Seafood

The market value of investment in the BC seafood industry is approximately $3 billion, including $2.1 billion in the harvesting sector, of which 85% is in licences and quota. In 2002, the seafood processing, aquaculture, and salmon harvesting sectors did not meet EBITDA (or Earnings Before Interest, Taxes, Depreciation, and Amoritization) revenue targets, while the herring, groundfish, and shellfish harvesting fleet segments did. It is clearly a priority to improve the financial performance of the industry as a whole.

	BC Seafood Financial Measures 2002		
Sector	Asset Value ($ billions)	Revenues ($ billions)	EBITDA Target (%)
Harvesting	$2.1	$0.36	40%
Aquaculture	$0.4	$0.30	15-25%
Processing	$0.4	$1.15*	10%

** includes harvesting and aquaculture revenue but excludes retail/distribution margins*

Various research and development initiatives are underway for the aquaculture sector, including the development of new vaccines, closed containment systems, and new species development. Significant potential exists to transform seafood plant waste into fish silage, fishmeal, and nutraceuticals and pharmaceuticals.

Promising new seafood preservation technologies being used around the world include Modified Atmosphere Packaging (MAP), ozonated water, and the sedative aqui-s for live fish shipments. However, these technologies have not been approved by the Canadian Food Inspection Agency (CFIA) for use in Canada.

The overall investment climate is generally poor, largely due to poor financial performance, unfavourable currency fluctuations, uncertainty related to aboriginal issues, and regulatory hurdles and delays in aquaculture.

Tidal Angling

The year 2002 was a good one for the BC tidal recreational fishing sector. In general, businesses such as lodges, charters, marinas, tackle manufacturers, and other suppliers had satisfactory financial performance. Nonetheless, the investment climate remains tenuous due to land claims uncertainty and the potential instability of regulations.

E. Supply Chain Issues

Seafood

Apart from the fish resource (see below), no serious supply chain issues face the wild fishery. With respect to aquaculture, BC has very good biophysical capability to grow both finfish and shellfish. Aquaculture production could potentially expand fivefold or more.

The BC farmed salmon industry has a competitive disadvantage relative to Chile and other world suppliers, given its high cost of smolt production. This reflects a reliance on land-based tank systems, due to difficulties in accessing lakes for more cost-effective rearing. The BC shellfish industry is also vulnerable because of its dependence on Washington State for the majority of its oyster and clam seed requirements.

There are currently no finfish feed supply issues. However, growing demands for forage fish, a key component of feed for global aquaculture, may drive up feed prices and spur conversion to more vegetable-based feeds. Two-thirds of the world's fishmeal is used in feed for poultry, pigs, and other animals. Terrestrial farmers have greater latitude in choosing feed composition for these animals, and would likely be the first to move to alternative sources.

Tidal Angling

No supply chain issues apply to tidal angling. In fact, several tackle manufacturers on Vancouver Island have developed new products, exporting them throughout North America.

F. Resources and the Environment

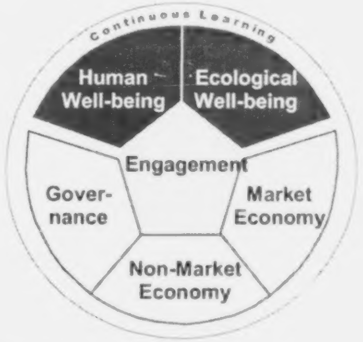
Seafood

The majority of wild fish stocks are "healthy". Some have a "mixed" status, including coho salmon, lingcod, and shelf/slope rockfish. Most species are fully exploited with the notable exception of salmon which has been managed very conservatively in recent years. Current salmon harvest rates of 20% to 40% are much lower than their historical range of 60% to 80%, and most stocks have rebuilt over the past five years or are at historic abundance levels.

Substantial progress has been made on sustainability and selective fishing practices in BC, through measures such as 100% Dockside Monitoring Programs (DMP) for Individual Quota (IQ) fisheries, observer programs, conservative fishing quotas, the re-siting of problem fish farms, codes of practice developed by the aquaculture sector, and effective co-management. Mandatory dockside monitoring is a condition of licence for all groundfish and herring fisheries. Challenges remain with respect to discards at sea, species that have no quota catch ceilings, and improved co-management.

The lack of Paralytic Shellfish Poison (PSP) testing facilities is a constraint to shellfish fisheries development on the North Coast. How an experimental new and emerging fishery can graduate to full commercial status is uncertain. Major impediments to implementing new and emerging fisheries are the cost of basic research, administrative complexity, and timely DFO decision-making. Other uncertainties surround the impact of changes in the ocean environment – El Nino, La Nina, and decadal scale cycle effects – and climate change on fish stocks and fisheries.

Sustainability encompasses both environmental and economic objectives. While BC has made progress towards sustainability of the capture fishery, challenges remain. Given the data deficiencies in most fisheries, the precautionary approach is an essential tool for sustainable fisheries management. It allows fishing to occur while more information on resource status is assembled.



Source: *International Institute for Sustainable Development 2002*

There is considerable confusion in the minds of the public, environmentalists, and some fisheries managers as to the true meaning of the precautionary approach and the far more restrictive precautionary principle. Under the precautionary principle, the threat of serious or irreversible damage results in a ban on fishing, even though there may be considerable uncertainty due to incomplete knowledge.

The *Species at Risk Act* (SARA), which came into force in June 2003, could have major impacts on how fisheries are managed and conducted. A number of BC salmon stocks have been designated as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). If these stocks are listed under SARA, recovery plans for them could severely affect mixed stock salmon fisheries.

The Wild Salmon Policy currently under development could also significantly impact fisheries management in BC. One of its objectives is to avoid the listing of species under SARA by facilitating action in advance of a conservation crisis.

The farmed salmon industry faces a variety of environmental issues, some potentially valid and in need of further investigation (e.g., Infectious Hematopoietic Necrosis or IHN, sea lice), and others based on a lack of understanding or misinformation that requires correcting (e.g., animal waste, fishmeal use, pollutants in feed, carotenoid use, antibiotics, drugs). Research is underway on the outstanding issues.

All farmed fish and shellfish go through a federally (CFIA) registered plant. The Canadian Shellfish Sanitation Program (CSSP) and other measures provide greater traceability for aquaculture compared to the wild fishery. Nevertheless, a HACCP-based Farm Food Safety program is being planned for shellfish and finfish aquaculture to provide traceability back to the farm site equivalent to that for terrestrial agriculture.

Tidal Angling

The recreational fishery is affected by the same resource and environmental issues as the commercial fishery, including the application of the precautionary approach, climate change, the Wild Salmon Policy, and SARA.

G. Catch Monitoring

Seafood

Catch monitoring is a cornerstone of sustainable fisheries in today's environmentally conscious world. All of BC's IQ fisheries and herring fisheries have strong dockside monitoring, where 100% of the harvest is validated at landing. Several IQ fisheries also have observer coverage or electronic monitoring to track bycatch and at-sea discards.

Non-IQ fisheries such as salmon, shrimp trawl, and prawn trap do not have dockside monitoring. Rather, a myriad of sales slips, logbooks, hail, and other measures are used. Some of these non-IQ fisheries including salmon have some level of observer coverage. (The crab fishery has electronic monitoring of catches.)

The catch monitoring systems for commercial salmon fisheries, especially the commercial aboriginal in-river components, require substantial improvement. That is, as with co-management in general, the catch monitoring programs for IQ fisheries are more advanced than for non-IQ fisheries.

Tidal Angling

DFO has no formal system for estimating recreational harvest and effort (angler-days) on a coast-wide basis. DFO Pacific Region does produce in-house estimates from a combination of creel surveys, logbooks, and observations by DFO staff. However, these estimates do not necessarily cover all areas of the coast, all months, and all types of angling (e.g., shore as well as boat-based angling); moreover, they vary widely in precision and accuracy.

H. Industry Liaison and Relationships

Seafood

An important feature of the food industry is cooperation between different agents in the value chain to produce the desired food product for the consumer. Unfortunately, BC seafood has historically been characterized by fractiousness and mistrust within and between the harvesting and processing sectors. While the farmed finfish sector does cooperate substantially – in large part due to the vertical integration of most growout and processing operations – farmed shellfish is also fragmented. Given the important regulatory role of government. BC seafood probably needs more cooperation than most food industries and a single voice to deal with high-level issues.

Some improvements are being made, particularly through harvester associations in IQ fisheries and the creation of the BC Seafood Alliance. With the oversight provided by environmental organizations and the need for value chain cooperation to remain competitive, all elements of the seafood sector must have strong, coherent industry associations.

Seafood industry segments also need to strike strategic alliances, horizontally and vertically. Again, some progress is occurring, for example, the Fisheries Council of Canada, Salmon of the Americas, and the world market perspective provided by multinational salmon farming companies.

The public image of the seafood industry has been affected by the often acrimonious relationships and conflicts that flare up in full public view, and the industry's inability to counteract negative environmental press while responding to legitimate environmental concerns.

Tidal Angling

The Sport Fish Advisory Board (SFAB) has provided strategic advice to the Minister of Fisheries and Oceans on a wide range of topics. The SFAB is effective because it represents all recreational interests and has the respect of governments.

V. SWOT RESULTS

SWOT is a planning tool used to identify the major factors affecting competitiveness and viability before creating a business strategy. These include current influences (strengths and weaknesses) and potential future developments (opportunities and threats) to the business or sector. The intent is to provide the information base to support clear, focused strategy formulation.

Exhibits S-3 through S-6 provide SWOT matrices for each of the four sectors under consideration: harvesting, aquaculture, processing and marketing, and recreational. Given the diversity within each sector, not every SWOT element is relevant to every industry segment.

A. Key Fish Harvesting Opportunities

Reform the Capture Salmon Fishery

As the major problem facing the fish harvesting sector, the wild salmon fishery also offers the primary opportunity for reform. The logic for this reform is as follows:

- There is a strong need to get more value from the salmon harvest (and to gain access to the surplus salmon available in many areas of the coast).
- Getting more value requires the delivery of better-quality fish to the processing plant and market.
- Better quality can only be achieved by slowing down the harvest, improving onboard handling, and undertaking shorter fishing trips.
- Harvesters are unlikely to engage in the above activities without a change in DFO fisheries management to give more secure resource allocations through property rights, individual quota, or the like.
- DFO will only change the management structure if there is clear consensus from a majority of salmon licence holders.
- Since there is no effective organization to provide a single voice on the required change, it does not happen.

Consequently, the main priority for the sector is to create a formal salmon harvester association, representing all eight gear and area combinations, and having a duly elected board of directors. Such an organization could be the catalyst and agent of much-needed reform, and could facilitate improved co-management.

Some industry segments view DFO, rather than their own lack of cohesiveness, as the principal barrier to salmon management reform. Whatever the root of the problem, the current development of eight Salmon Area Councils with duly elected boards, and the subsequent launch of a Commercial Salmon Advisory Board, represents a major opportunity.

Improve Security of Tenure

Improved security of tenure for DFO fishing licences, now a limited fishing privilege issued annually, would help harvesters secure their investments and business value, extend the business planning horizon, and facilitate future investment and co-management initiatives. The unfettered discretionary authority vested in the Minister of Fisheries and Oceans, and entrenched in the *Fisheries Act*, is the issue. However, there are models for the Minister to retain statutory authority but delegate administrative responsibility on certain fisheries practices (e.g., the devolution of management responsibility for freshwater fisheries to the Western provinces).

Improve Fish Quality

Although the IQ management system has resulted in substantially better fish quality, there is a need for ongoing improvement as market quality standards escalate. In particular, shorter fishing trips and better on-board handling for IQ fisheries, including bleeding of finfish, are required. Implementing these techniques may require instruction and training.

Enhance Fish Quality with Better Traceability

Ultimately, the traceability of harvests back to the vessel and fishing location is likely to be a market requirement. The above changes to salmon management, if they occur, will also enhance traceability and sustainability, by slowing down the harvest and ensuring the necessary labelling of individual vessel production. Traceability requirements will enhance the tracking of different quality fish through the seafood value chain, and will provide the price incentives to meet high-end market needs.

Market Sustainability

Several features of BC's world-leading commercial catch monitoring systems, such as the 100% observer program for groundfish trawlers, could be marketed for export as providing both traceability (i.e., where, when, how, and by whom the fish was harvested) and sustainability (i.e., how it was harvested and what, if any, bycatch and discards resulted). Sustainability potentially confers a marketing advantage.

B. Key Aquaculture Opportunities

Ensure Timely Regulatory Processes

The major opportunity for the aquaculture sector, both finfish and shellfish, is to have a more efficient and timely regulatory process, especially in the case of federal CEAA reviews. CEAA is a major constraint on aquaculture growth, investment, employment, and viability. The Province could contribute to an improved process through the bulk zoning of broad areas for aquaculture development, with each bulk area undergoing one CEAA process. This would create economies of scale in regulation, lower costs, and reduce timelines for approvals.

Cultivate Whitefish Species

The farming of "whitefish" species, such as halibut and sablefish, offers promise to fill the market gap left by greatly reduced catches of Atlantic cod worldwide. In addition, it can develop new markets in high quality food service (restaurant) businesses.

Inform the Public

Developing and disseminating accurate information on the environmental sustainability of finfish aquaculture is a challenge. The primary concern is the effect of sea cage farming on wild stocks and the marine environment. While admittedly there are some continuing questions, and more research is needed on sea lice and other topics, considerable confusion and misinformation also exists in the minds of consumers and the general public.

Adding to the widespread confusion is a lack of information on the industry's importance to the economy, and to coastal communities and First Nations. Such information would allow environmental concerns to be weighed along with the economic benefits. This information gap needs to be addressed in a coherent manner.

Cooperate More in Shellfish

The farmed shellfish sector has some particular problems related to its small size, fragmentation, and lack of marketing capability. There is realistic potential to significantly multiply production per hectare from existing sites, provided that technology transfer, greater professionalization and diligence, and cooperation among harvesters are fostered. It also appears prudent for the many small growers to work with processors to provide the consistent product volumes, quality, and prices demanded by the market. This requires cooperation within the sector.

C. Key Seafood Processing and Marketing Opportunities

Meet Consumer Needs

The ability to serve high-quality, high-value seafood market niches requires proper orientation and cooperation by the all the elements in the value chain, from fisheries managers and regulators to harvesters and growers to processors to distributors. Industry must produce the differentiated food products to consistently deliver the product attributes in the supply volumes that consumers want and value. This requires investigating consumer needs, as well as implementing quality and grading standards to instill customer confidence. The ongoing Agriculture and Agri-Food Canada Seafood Value Chain exercise can assist in these areas.

Invest in Capital and Human Resources

A new business model for the BC seafood industry also requires additional investment in plants, equipment, product development, and human resources. These much-needed investments are not being made in the current climate of poor financial returns and viability. In large part, the reason is government regulation and policy at the fish harvesting and farm level, and the considerable uncertainty facing seafood businesses tied to aboriginal land claims issues.

Pursue Quality as the BC Advantage

With production volumes too low and cost structures too high to compete successfully in commodity markets, BC seafood processors need to make quality their competitive advantage. Quality can be the province's advantage on three grounds:

- A clean, cold marine environment ensures the intrinsic quality of our capture and aquaculture raw material.
- The nearshore location of most harvesting and farming operations allows quality raw material, if handled well, to be maintained until reaching the processing plant door.
- BC's strategic geographic location promotes cost-effective access to very large seafood markets in the US (by truck) and Asia (by air).

The market for top quality seafood, especially live and fresh products, is more regional and narrow than the global market for commodity seafood products. That is, the market for quality seafood is less of a commodity business and therefore a market for which BC is better-positioned to compete.

Attract New Workers

With much of their workforce about to retire, there is an opportunity in traditional capture salmon, herring, and groundfish plants to attract workers who are younger and better educated and skilled, These prospective new workers can continue to learn and embrace the "lifelong learning" culture needed to compete successfully in today's fast-changing food business. To realize this potential requires offering more than seasonal jobs.

Extend the Salmon Season

If, as suggested above, the salmon harvesting industry organizes itself and facilitates change in fisheries management and operating practices, then salmon processors would have somewhat longer operating seasons and much better quality raw material with which to work. They should also be able to achieve plant cost savings, develop new products, and better focus on the market. This is one example of the potential to improve quality and market returns for BC seafood.

Develop the Domestic Market

There appears to be an opportunity for increased BC seafood sales within Canada. Increased domestic sales would not only avoid exchange rate and other risks in the international marketplace, but would likely engender greater public support for the seafood industry in the province.

Investigate New Technologies and Develop Opportunities

Much of the potential in market development, quality improvements, and increased returns exists with fresh and live fish. For these products, the seafood industry should investigate new preservation technologies, such as Modified Atmosphere Packaging (MAP), ozone treatment or flushing, and the sedative aqui-s for live fish shipments. Many of these technologies are approved for use in the US and other countries, but are not accredited in Canada, so industry would need to work with CFIA. Federal and provincial governments should look beyond their traditional regulatory and scientific role, and work with industry on developing opportunities and capabilities to compete in the global food industry.

D. Key Tidal Recreational Fishery Opportunities

Increase DFO Resources

DFO Pacific Region does not have a formal Recreational Fisheries Division. DFO personnel, including licensing and administrative personnel, devoted to the recreational fishery is estimated to represent at most 10 person-years. In contrast, the Alaska Division of Sport Fish has about 160 permanent full-time employees and an additional 240 seasonal and temporary positions. The predictable result is a lack of DFO attention and resources in the recreational fisheries arena.

Improve Catch Monitoring

One symptom of the lack of DFO resources is the less than adequate catch monitoring system for the BC tidal recreational fishery, especially for non-salmon species. Without credible catch monitoring, negotiating and adhering to formal allocation agreements or targets is extremely challenging. In the absence of improved monitoring, the recreational sector will remain vulnerable to the concerns of other resource users who are subject to more stringent catch monitoring programs. Improving the catch monitoring system is a major opportunity.

One way to fund the necessary improvements in catch monitoring is via increased licence fees ("user pay"), with the additional monies directed towards catch monitoring and resource management initiatives. However, under present federal Treasury Board policy, earmarking any licence fees is difficult.

Cultivate New Anglers

Another important issue facing the sector is the decline or arrested growth in angling participation. To reverse this trend and establish the next generation of resource advocates will require some combination of public education, cooperative marketing programs, and possibly infrastructure development (e.g., public ramps and access, enhancement-based fisheries). In BC, there is a large untapped urban population within a two-hour drive of excellent fishing opportunities. In addition, North America has a growing segment of avid outdoor recreationists and tourists, with substantial disposable income, that can be nurtured as clients for the wide variety of packaged fishing services offered by BC lodges and charters.

In both of these areas, improved catch monitoring and increased angler participation, BC can learn from experience elsewhere, such as Alaska's comprehensive catch reporting system and the "Water Works Wonders" marketing campaign in the lower 48 states.

Enhance Selected Stocks

Another opportunity is the enhancement of certain stocks (e.g., Georgia Strait coho), with a recreational fishery targeted at the enhanced stocks using selective fishing measures (e.g., mark-only fisheries). Increased access to abundant coho resources, particularly in Georgia Strait, would go a long way to slowing or reversing the decline in angling participation.

Promote Angling as a Tourism Activity

The Province could also stimulate the recreational fishery sector through greater integration of angling messages in broad-based tourism promotions by Tourism BC and others. Angling could be promoted as one part of a multi-faceted tourism experience. Furthermore, the 2010 Olympic and Paralympic Winter Games to be held in Vancouver offer a once-in-a-lifetime opportunity to market BC for a variety of outdoor pursuits, including angling.

More generally, greater attention could be devoted to the recreational fishery's economic contribution and potential for growth. The Province can play an important role in influencing DFO decisions and decision-making processes beyond its limited mandate in the tidal recreational fishing area.

VI. ABORIGINAL ISSUES AND OPPORTUNITIES

Address Land Claims and Other Uncertainty

The majority of BC's land base is not subject to treaties and therefore may remain subject to aboriginal rights and/or title. Existing fisheries and aquaculture businesses cite the uncertainty surrounding land claims and AFS processes as a major barrier to long-term planning and investment.

Aboriginal people comprise a significant 20% share of the employment base of the seafood and recreational fisheries sectors in total. These participants suffer from the same uncertainty of rights and continued access/jobs as their non-aboriginal counterparts. On the other hand, land claims settlement should provide greater certainty to existing business as well as increased opportunity for new businesses, both aboriginal and non-aboriginal.

New Aboriginal Business Development Opportunities

Aboriginal people have a strong preference for economic development that conforms to and complements their cultural traditions and identity. Fisheries and aquaculture offer a unique business development opportunity for BC's coastal aboriginal people. In many cases, individuals can tap business and employment opportunities in their home communities, and avoid the need to move to urban centres. This is especially true for shellfish culture opportunities.

The settlement of land claims represents a significant business opportunity. Under settlement, aboriginal people could receive substantial financial support, resources ("fee simple" land, fish allocations, etc.), and other entitlements that could be used to launch seafood and tourism businesses. In addition, under current federal and provincial government policies, many new capture fisheries and aquaculture entities require significant aboriginal consultation, cooperation, and, in some cases, participation.

Nevertheless, significant hurdles exist, not the least being the harsh business realties of the global seafood industry, driven increasingly by economies of scale and trade in seafood raw material and finished products. Business acumen and marketing expertise are essential for this business climate.

Despite the challenges, aboriginal business opportunities do exist. In developing these opportunities, it appears prudent to start small and/or to arrange joint ventures with non-aboriginal interests to bring requisite expertise to the table. A strong business focus is also imperative, along with the creation of a separate business entity other than a Band Council or Band-controlled corporation.

VII. FINAL COMMENT

There are many alternative uses to the ocean environment, including ecotourism, foreshore development, and oil and gas exploration. Without broad public support, the BC seafood and angling sectors could see their continued access to the marine environment diminished or threatened. Moreover, bad news and controversies in one sector can and have had negative spillover market effects. United, the fisheries and aquaculture sectors are stronger and more influential. All sectors should acknowledge one other's legitimacy, realize the commonality of their interests, and work together.

Exhibit S-3: SWOT Analysis – BC Fish Harvesting

Strengths

1. Relatively **healthy fish populations** and natural environment
2. **IQ fisheries** management for many fisheries
3. **Sustainability and co-management success** of several fisheries, e.g., herring
4. Several **"market-driven" fisheries**, e.g., geoduck, groundfish trawl
5. **Near-shore fishery** fleet allows quality fish to be landed
6. **Entrepreneurial spirit**
7. Several strong, **effective industry associations**
8. **Selective fishing** practices
9. World-recognized **dockside/electronic monitoring** and observer programs
10. Fisheries pay **resource access fee** (rent) to Crown

Opportunities

1. Creation of **effective salmon harvester industry association**
2. **Fisheries management changes** to meet market needs, e.g., consistent availability, quality, and price
3. **Greater security of tenure** under fishing licences
4. **Training** with respect to improved onboard handling procedures, bleeding fish, live hauling fish, etc.
5. **Settlement of aboriginal land claims**
6. **Higher quality** and prices
7. **Integrated groundfish fleet management**
8. **Strategic alliances** among harvester groups
9. More **direct sales** to public, more self processing and direct sales in niche markets
10. **Regular reporting** of economic dimensions and importance of industry

Weaknesses

1. **Lack of effective salmon harvester association** /salmon fishery is not "market-driven"
2. **Reluctance** of industry and government **to change** with the times and cooperate
3. **High labour and other costs**, lack of economies of scale due to low production levels, fleet overcapacity
4. **Poor markets** for some species, e.g., pink and chum salmon
5. **Inability to attract crew labour** due to inadequate financial rewards in some fisheries
6. **Fish "left in the water"** because of low prices or a lack of buyer in some cases
7. **Long trip lengths** in some fisheries reduce quality, e.g., halibut
8. **Lack of traceability** back to the vessel and areas where fish are caught
9. **Fish utilization/discards/bycatch issues** in some fisheries
10. **Poor economic data** on the industry

Threats

1. **Potential resource declines** due to oceanographic and climate changes, pollution, and urban encroachment
2. **Aboriginal land claims process** and associated uncertainty
3. Adoption of the **precautionary principle** rather than the precautionary approach to resource management
4. Continued **lack of economic perspective** in resource management decisions
5. **Reduced DFO funding** of science
6. **SARA-imposed restrictions** on fishing opportunities
7. **Environmental opposition** to commercial fishing in BC
8. Public perception of **food safety issues**
9. **Strengthening Canadian dollar**
10. **Lack of public** and community **support** for the commercial fishery

Exhibit S-4: SWOT Analysis – BC Aquaculture to Farm Gate

Strengths

1. **Good biophysical growing conditions** for both finfish and shellfish (room for expansion)
2. Relatively **clean water and environment** relative to Lower 48 competitors
3. **Proximity to US market**
4. Consolidation of salmon operations, strong presence by large **multinationals selling food around the world**
5. **Codes of practice** developed by and with the cooperation of industry
6. **Good traceability** (all products flow through federally-registered plants)
7. **Good backward linkages** and forward linkages for most industry supplies and services
8. **"Naturalness" of bivalve shellfish**/health benefits of seafood in general
9. **Strong market demand for clams**
10. **Good quality reputation** of BC cultured finfish and shellfish

Opportunities

1. More efficient and **timely CEAA review process** (new tenures and renewals)
2. **Bulk zoning** of broad areas for aquaculture development
3. **Access to** more **lakes for smolt rearing**
4. Farming of **new "whitefish" species** – halibut, sablefish, cod
5. **Improved productivity**/consolidation from shellfish tenures
6. **Technology transfer** in farming shellfish and farming new finfish species
7. More **coordination of marketing** and deliveries by shellfish producers
8. **New preservation technology** to extend shelf-life – MAP, ozone
9. Increased sales to the **domestic Canadian market**
10. **Increased capacity** for environmental research and monitoring **in rural BC**

Weaknesses

1. **Regulatory delays in CEAA approval process**
2. **Lack of federal-provincial harmonization** of the tenure approval process
3. BC is a **high-cost producer** – high wages, smolt and regulatory costs, lack of economies of scale
4. **Lack of DFO support** to develop new species for aquaculture
5. **Limited technology transfer** in the shellfish sector
6. **Dependence on Canada's East Coast for farm site labour** in salmon
7. **Dependence on Washington State for seed** in shellfish
8. **Lack of water quality monitoring** in **Central and North Coast**
9. **Environmental opposition**, poor public image, mixed public support
10. **Poor** profile and **economic data** on industry

Threats

1. **Real environmental**, disease and product quality **issues** e.g., IHN, Kudoa
2. **Perceived environmental**, disease, and product quality **issues** (attacks by some environmentalists, wild producers, media)
3. **Strengthening Canadian dollar**
4. **Increasing world supply** of low-cost farmed finfish
5. **Feed cost increases** for farmed finfish
6. **Water quality and disease outbreaks**
7. Aboriginal **land claims process** and associated uncertainty
8. Lack of **access to wild broodstock** to culture new species
9. **Lack of technical knowledge** prevents BC from culturing new species
10. **Loss of public** and community **support** for aquaculture

Exhibit S-5: SWOT Analysis – BC Seafood Processing

Strengths

1. Consumer **trend to healthy diet/seafood** consumption is growing worldwide
2. **Proximity to US and Asian markets**
3. High quality and **reputation of Canadian fish inspection** system
4. **IQ fisheries management** system produces quality raw material in most cases
5. **BC farmed salmon sites** produce **quality** raw material and deliveries are scheduled to meet market demand
6. Skills and **efficiency of farmed fish processing plants**
7. **Vertical integration of farmed salmon** growout, processing, and marketing operations
8. **Vertical integration of wild salmon, herring, and groundfish operations**
9. Selected **high-quality niche products**, e.g., herring roe, geoducks
10. Top tier **Seafood Alliance industry association**

Opportunities

11. Improved quality raw material if **salmon management changes**
12. **Improving quality, slower more consistent plant volumes** can spur product development, cost savings
13. Produce high **value-added processed niche products**
14. Increased focus on and sales to **domestic Canadian market**
15. Achieving **MSC certification**
16. **New preservation technologies** to extend shelf-life – MAP, ozone
17. Focus on quality and **high-end fresh/live market** to the extent possible
18. **Greater traceability** including tag programs, third party monitoring
19. **Reskilling of workforce** in quality, traceability, marketing
20. **Value Chain Round Table** for seafood

Weaknesses

1. **Inconsistent timing, quality, and price** of some BC raw material, especially salmon
2. BC is a **high cost producer** – wages, environmental regulations, and inspection
3. **Lack of MSC certification** that is important to several European markets
4. Increasing **market power to large distributors**, discounters, and retailers
5. **Aging and low skills** of much of the **wild fish plant workforce**
6. **High cost** of Canadian environmental and fish inspection standards
7. **Small size** of seafood processors/marketers on the world stage
8. **Farmed salmon** is becoming a **commodity**
9. **Lack of cooperation** between wild and farmed seafood sectors
10. **Fragility of the capture salmon processing sector**

Threats

21. Aboriginal **land claims process** and associated uncertainty
11. Imminent **collapse of the capture salmon processing** industry
12. **Stronger Canadian dollar**
13. **Weak world economies**
14. Increasing **non-tariff trade barriers**
15. **Environmental opposition** to industry – wild and farmed
16. **Failure to reskill** the workforce
17. **Failure to improve traceability and sustainability**
18. **Large** wild **salmon volume from Alaska**/large farmed salmon volumes from **Norway and Chile**
19. **Lack of** community and **public support** for the seafood industry

Exhibit S-6: SWOT Analysis – BC Tidal Recreational Fishing

Strengths

1. Relatively **healthy fish populations**/one of few areas in world with access to wild salmon
2. Relatively **pristine, uncrowded** marine and terrestrial environment/habitat
3. **Variety of experiences** from world class destination lodges to shore-based angling close to urban centres
4. Proximity to US and **cost-effective travel to BC** by air and vehicle
5. DFO policy of **priority access** to anglers **for chinook and coho** salmon
6. **Reasonable** daily and bag **possession limits**
7. **Good access** – extensive coastline including an accessible shoreline and network of harbours/marinas
8. **Strong community ties** by anglers through volunteerism, local involvement, and the SFAB process
9. **Growth in shore-based angling**, flyfishing, and angling by women and families
10. Image of **Canada** as a **safe country to visit**

Opportunities

1. **Improved DFO commitment**, staffing, and resources in recreational fisheries management
2. **Improved catch monitoring**
3. Licence fee increases to provide **additional money** targeted at **catch monitoring** and resource management
4. **Enhance stocks** (e.g., Georgia Strait coho) and apply selected fishing (e.g., mark-only harvests)
5. **Public education**, marketing, and infrastructure
6. **Closer links** between recreational **fishing** and broader **Tourism BC** marketing programs
7. Use **2010 Olympics** as a world stage to promote a variety of BC destination activities, including angling
8. Compulsory **logbook program** for **guides and lodges** to promote sustainability and resource management
9. **Strategic alliances** – potential joint ventures with aboriginal groups, packages with non-fishing businesses
10. **Regular reporting** of economic dimensions and importance of the industry

Weaknesses

22. **Lack of DFO attention**/leadership, personnel, and financial resources devoted to the recreational fishery

23. **Inadequate catch monitoring**

3. **Uncertainty** tied to **aboriginal land claims**

4. **Declining resident participation**; take-up by new Canadians and urban residents is low

5. **Lack of knowledge**/education as to **angling opportunities**

6. **Lack of "single window" provincial ministry** to champion and serve the sector and liaise with DFO

7. **Poor government and industry communications** with media/no focal point or organization for media contact

8. **Lack of DFO stock assessment** work on lingcod, rockfish, and other species

9. **Lack of integration** between **recreational fishing** and broader Tourism BC marketing programs

10. **Poor** market and **economic data** on angling and importance of angling to tourism mix

Threats

1. **Potential resource declines** due to oceanographic and climate changes, pollution, and urban encroachment
2. A **preservationist** rather than conservationist (or sustainability) **approach to** resource management
3. **Strengthening Canadian dollar** makes Alaska more price competitive
4. **Attacks on sustainability grounds** due to inadequate catch monitoring
5. Restricted angling opportunities to protect any **SARA**-listed species
6. **Potential** mid-season **regulatory changes** including closures
7. Aboriginal **land claims process** and associated uncertainty
8. Potential **shutdown of salmon hatcheries** due to DFO funding cutbacks
9. **Failure to cultivate** next generation of anglers
10. **Loss of public** and community **support** for angling

Preface

This report was prepared under contract for the BC Ministry of Agriculture, Food and Fisheries to assess the competitiveness of the BC seafood sector, its harvesting, aquaculture, and processing components, and the BC tidal recreational fishing sector.

The consultants have benefited from discussions with industry, government, and others. Notwithstanding this assistance, the authors have final responsibility for the analyses and conclusions of this study.

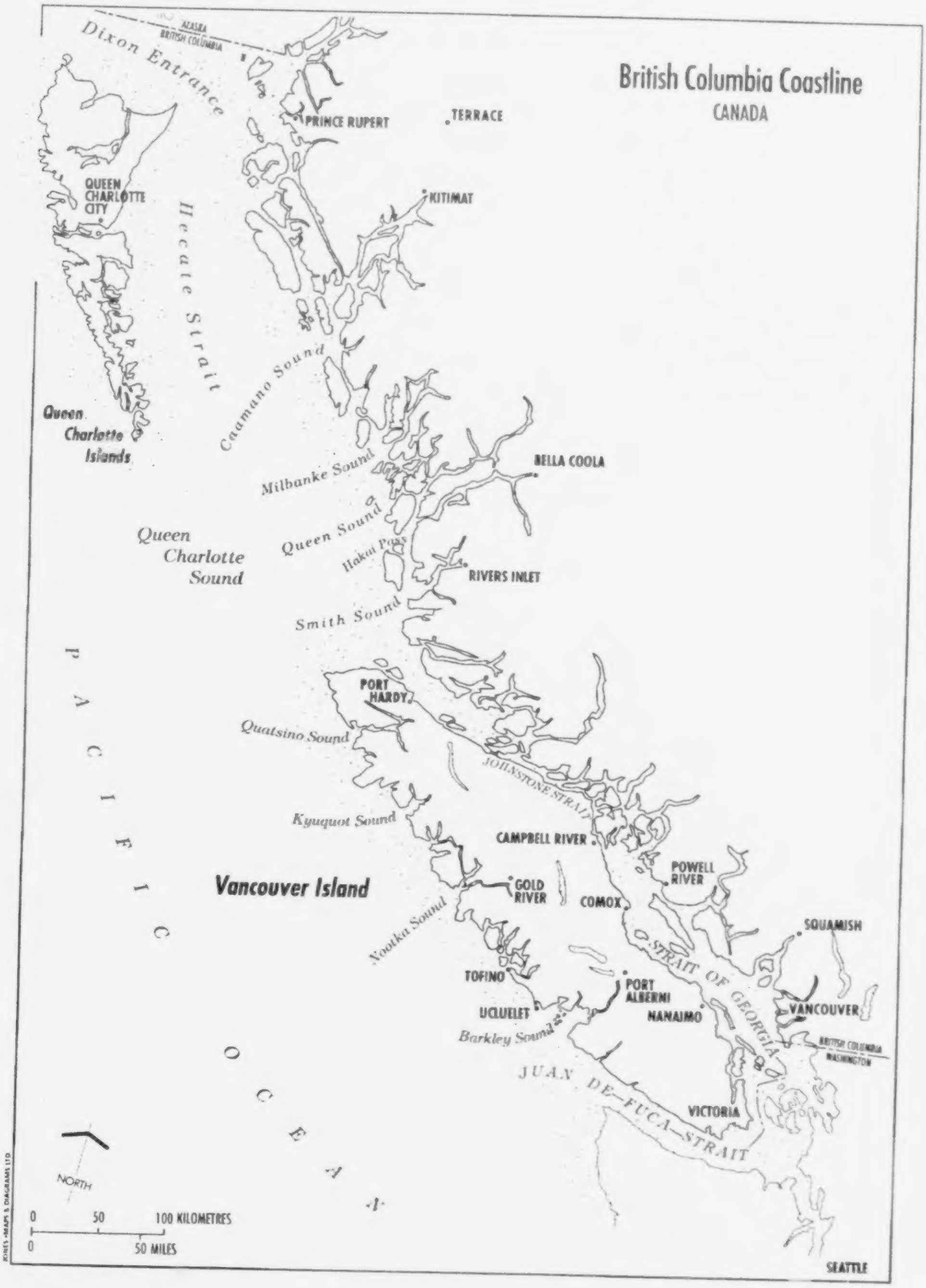
Acronyms

Acronym	Full
AABC	Aboriginal Aquaculture Association of BC
AASR	Annual Aquaculture Statistical Report
ADFG	Alaska Department of Fish and Game
ACOA	Atlantic Canada Opportunities Agency
AFPS	Annual Fisheries Production Schedule
AFS	Aboriginal Fisheries Strategy
ASMI	Alaska Seafood Marketing Institute
BCARDC	BC Aquaculture Research and Development Committee
BCSFA	BC Salmon Farmers Association
BCSGA	BC Shellfish Growers Association
BCSMC	BC Salmon Marketing Council
BCWF	BC Wildlife Federation
BSE	Bovine Spongiform Encephalopathy
CAIA	Canadian Aquaculture Industry Alliance
CCFAM	Canadian Council of Fisheries and Aquaculture Ministers
CAFI	Canadian Agriculture and Food International program
CCG	Canadian Coast Guard
CEAA	Canadian Environmental Assessment Act
CFIA	Canadian Food Inspection Agency
COOL	Country of Origin Labelling
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPP	Canada Pension Plan
CSA	Canadian Sablefish Association
CSSP	Canadian Shellfish Sanitation Program
CU	Conservation Unit
DFO	Canada Department of Fisheries and Oceans
DMP	Dockside Monitoring Program
EBITDA	Earnings Before Interest, Taxes, Depreciation, and Amortization
EFTA	European Free Trade Agreement
EI	Employment Insurance
EM	Electronic Monitoring
ESSR	Excess to Salmon Spawning Requirements
EU	European Union
FAO	Food and Agriculture Organization
FAS	Frozen at Sea
FCBC	Fisheries Council of BC
FCC	Farm Credit Corporation

Acronym	Full
FFAW	Food, Fish and Allied Workers
FHMP	Fish Health Management Plan
FLUPSY	Floating Upweller System
FPI	Fishery Products International
FRC	Fisher Registration Card
FTA	Canada-US Free Trade Agreement
FTAA	Free Trade Agreement of the Americas
FTE	Full-Time Equivalent
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
HAB	Halibut Advisory Board
HACCP	Hazard Analysis and Critical Control Point
HRCS	Herring Resource Conservation Society
HRDC	Human Resources Development Canada
HS	Harmonised System
IHN	Infectious Hematopoietic Necrosis
IPHC	International Pacific Halibut Commission
IQ	Individual Quota
IQF	Individually Quick Frozen
ISER	Institute for Social and Economic Research
ITQ	Individual Transferable Quota
IVQ	Individual Vessel Quota
LWBC	Land and Water BC
MAFF	BC Ministry of Agriculture, Food and Fisheries
MAP	Modified Atmosphere Packaging
MED	Marine Emergency Duties
MFN	Most Favoured Nation
MOU	Memorandum of Understanding
MSC	Marine Stewardship Council
MV	Market Value
NAFTA	North American Free Trade Agreement
NBBC	Native Brotherhood of BC
NBV	Net Book Value
NGO	Non-Governmental Organization
NMFS	National Marine Fisheries Service
NNFC	Northern Native Fishing Corporation
NRFTG	National Recreational Fisheries Task Group
NWPA	Navigable Waters Protection Act
OAL	Overall Allowable Length
OCAD	Office of the Commissioner for Aquaculture Development
OECD	Organisation for Economic Co-operation and Development
OFFS	On-Farm Food Safety

Acronym	Full
PBS	Pacific Biological Station
PCB	Polychlorinated Biphenyls
PDO	Pacific Decadal Oscillation
PFAR	Pacific Fisheries Adjustment and Restructuring Program
PFRCC	Pacific Fisheries Resource Conservation Council
PHMA	Pacific Halibut Management Authority,
POP	Persistent Organic Pollutant
PSA	Pilot Sales Agreement
PSHA	Pacific Salmon Harvesters Association
PSP	Paralytic Shellfish Poison
PY	Person-Year
QCI	Queen Charlotte Islands
QMP	Quality Management Program
RBC	Royal Bank of Canada
RSW	Refrigerated Sea Water
SAR	Salmon Aquaculture Review
SARA	Species at Risk Act
SARS	Severe Acute Respiratory Syndrome
SCH	Small Craft Harbour
SE	Sockeye Equivalent
SFAB	Sport Fishing Advisory Board
SFI	Sport Fishing Institute
SMP	Shellfish Management Plan
SOTA	Salmon for the Americas
SPAA	Society for the Positive Awareness of Aquaculture
SQA	Supplier Quality Assurance
SWOT	Strengths-Weaknesses-Opportunities-Threat
TAC	Total Allowable Catch
UFAWU	United Fishermen and Allied Workers' Union
UHA	Underwater Harvesters Association
USCBP	US Customs and Border Patrol
USDA	US Department of Agriculture
USDOC	US Department of Commerce
USEPA	US Environmental Protection Agency
USFDA	US Food and Drug Administration
USITC	US International Trade Commission
WCB	BC Workers' Compensation Board
WCO	World Customs Organisation
WCVI	West Coast of Vancouver Island
WED	Western Economic Diversification
WSP	Wild Salmon Policy
WTO	World Trade Organization

Map of BC Coastline


British Columbia Coastline
CANADA
ALASKA
BRITISH COLUMBIA
Dixon Entrance
PRINCE RUPERT
TERRACE
KITIMAT
QUEEN CHARLOTTE CITY
Hecate Strait
Caamano Sound
Queen Charlotte Islands
Milbanke Sound
BELLA COOLA
Queen Sound
Hakai Pass
Queen Charlotte Sound
RIVERS INLET
Smith Sound
PACIFIC OCEAN
PORT HARDY
Quatsino Sound
JOHNSTONE STRAIT
Kyuquot Sound
CAMPBELL RIVER
POWELL RIVER
Vancouver Island
GOLD RIVER
COMOX
Nootka Sound
SQUAMISH
STRAIT OF GEORGIA
TOFINO
PORT ALBERNI
NANAIMO
VANCOUVER
UCLUELET
Barkley Sound
BRITISH COLUMBIA
WASHINGTON
JUAN DE FUCA STRAIT
VICTORIA
NORTH
0 50 100 KILOMETRES
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Part A. Introduction

1.0 THE SETTING

The Province of British Columbia has commissioned a study to assess the strengths, weaknesses, opportunities, and threats ("SWOT analysis") of the BC seafood and tidal recreational fishing sectors. The seafood sector consists of three subsectors: the capture (or wild) fishery, the aquaculture (or farmed) industry, and the processing and marketing of capture and aquaculture products.

1.1 The Need for the Study

BC's seafood and recreational fishery sectors benefit from natural advantages and growing markets.

British Columbia offers numerous environmental, biological, and geographic advantages for the seafood and tidal recreational fishing industries. The wild fish and shellfish resource is, for the most part, healthy. Large near- and foreshore areas show very good biophysical capability for culturing seafood. In addition, BC has a relatively pristine environmental setting that attracts many types of outdoor recreationists including anglers.

Consumption of both wild and cultured seafood is rising worldwide spurred by health concerns and a desire for better nutrition in developed countries, and by increased incomes in the developing world. Outdoor recreation is one of the fastest growing tourism segments in North America. BC is also well situated next to the United States, the largest market in the world.

Physical, regulatory, and other changes challenge the sectors.

Since the early 1990s, however, BC's seafood and tidal recreational sectors have witnessed fundamental and unprecedented changes in a number of key areas. Changing oceanographic conditions have led to lower productivity and, for some species, fewer fish. The Canadian regulatory and policy environment has altered substantially with the shift to stronger property rights in fisheries management, adoption of the precautionary approach, and the introduction of the Aboriginal Fisheries Strategy (AFS) and the Canadian Environmental Assessment Act (CEAA) review process.

Other changes relate to the effects of globalization, through the liberalization of trade, greater capital mobility, and technological advances in transportation, communications, and other services. For example, fish no longer needs to be processed adjacent to the fishing grounds or growing areas. From an economic perspective, national boundaries are essentially being erased. As a result, industry faces increased competition as well as increased opportunities.

Industry faces constraints to adapting to the new global economy.

Industry, in general, can encounter difficulty adapting to the new business conditions of this global economy. Constraints on industry success include:

- a lack of leadership, cohesion, and the will to respond to change;
- a focus on the short term, to the detriment of long-term strategic planning;
- production inefficiencies;
- the neglect of research and development such as developing new products, improving product quality, and investing in human resources;
- a lack of attention to changing consumer needs; and
- inefficient and/or inflexible government regulation.

As this report will demonstrate, many of the these shortcomings characterize the seafood and tidal recreational sectors in BC. There is a compelling need and substantial opportunity to reposition and reorient these sectors. Changes in industry behaviour and government practice can significantly enhance business financial viability.

Both industry and government must change to ensure long-term viability of the seafood and recreational sectors.

Government regulations and policy are much more pervasive and far-reaching in the BC seafood sector and recreational fishing than in almost any other economic sector. However, the responsibility and opportunities for repositioning lie primarily with private enterprise. There is considerable potential for both industry and government to change, innovate, and adapt, so that the provincial seafood and recreational fishing sectors can be viable and competitive over the long term.

1.2 Study Objectives

The study purpose is to inform industry, government, First Nations, and other interests.

The intent of this business-focused study is to provide the information foundation to support strategic planning by the Province of British Columbia. The study will also be of interest to industry groups, the federal government (including the Department of Fisheries and Oceans, the Department of Indian Affairs and Northern Development, and other federal departments and agencies), First Nations, and others. The study addresses several broad topics:

- Market demand conditions (e.g., consumer and market trends, demographic shifts, tariff and non-tariff trade barriers);
- Factor supply conditions (e.g., resources, labour and training, capital investment and viability, research and development);
- Government policies and regulations (e.g., resource access, environmental management, human health and safety, co-management and fees, aboriginal rights and policies);
- Relationships within and between industry and governments (e.g., industry leadership and associations, strategic alliances, federal-provincial cooperation); and
- Macroeconomic environment (e.g., currency exchange rates, economic growth).

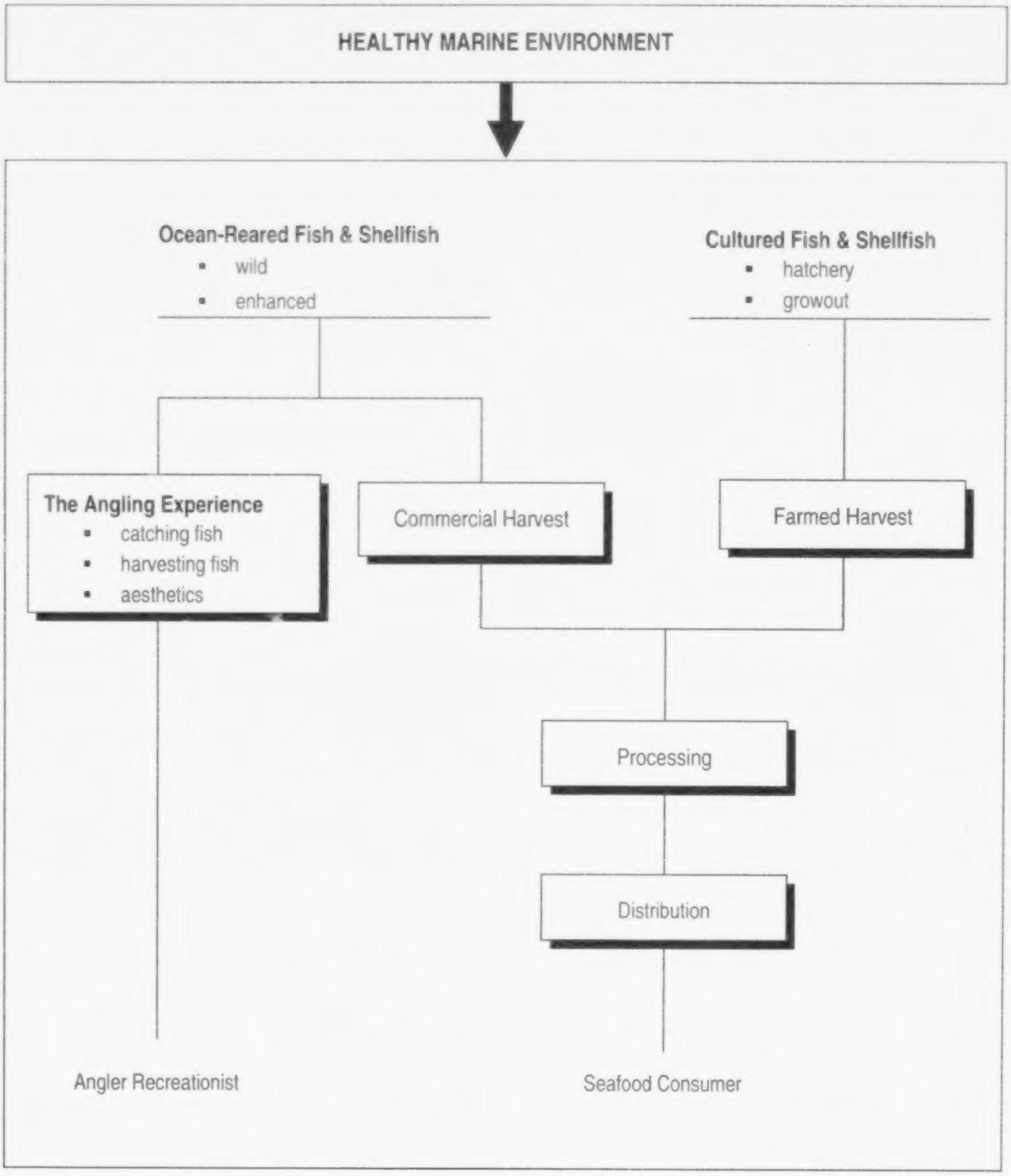
The seafood and tidal recreational fishing sectors are analyzed in this one comprehensive study since both depend on a healthy marine environment (Exhibit 1). The sectors are linked through common issues such as sustainability, conservation, and regulation. One of the study's goals is to spur not only informed discussion and debate, but also the will to implement change on the part of a variety of stakeholders and interests.

The ocean environment and its resources have great value to the aboriginal peoples of British Columbia. However, the aboriginal food, social, and ceremonial use of marine resources is outside the study Terms of Reference. Nevertheless, the study does identify existing aboriginal participation and does address aboriginal business opportunities in the seafood and recreational fishing sectors.

1.3 Approach and Methodology

To complete the SWOT analysis requires a multi-disciplinary approach and several avenues of investigation. The study project team combines expertise and experience in the four industry sectors (fish harvesting or capture fisheries, aquaculture or fish farming, fish processing, and recreational fishing) and in a variety of subject areas (economics and statistics, resource and environmental assessment, marketing, human resources, financial analysis and business viability, and fisheries policy and management).

Exhibit 1: An Overview of the Seafood and Recreational Fishing Sector


HEALTHY MARINE ENVIRONMENT
Ocean-Reared Fish & Shellfish
wild
enhanced
Cultured Fish & Shellfish
hatchery
growout
The Angling Experience
catching fish
harvesting fish
aesthetics
Commercial Harvest
Farmed Harvest
Processing
Distribution
Angler Recreationist
Seafood Consumer

The study draws on extensive interviews, surveys, and other information sources.

The research program for the study consisted of:

- interviews with 183 individuals (see Appendix F), many of which occurred during study visits to the communities of Campbell River, Duncan, Nanaimo, Port Alberni, Port Hardy, Port McNeill, Prince Rupert, Quadra Island, Tofino, and Ucluelet;
- reviews of more than 100 reports and publications (see References);
- two surveys: one on international seafood markets and another on Queen Charlotte Islands fishing lodges;
- several one-page case studies, presented throughout the report; and
- analysis and extension of economic and statistical information for each sector.

Number of Interviews

Industry		101
Fish Harvesting	20	
Aquaculture	19	
Seafood Processing & Marketing	32	
Recreational Fishing	30	
Government		60
Federal	46	
Provincial	9	
Regional and Municipal	5	
Other (e.g., financial institutions, First Nations, environmental groups)		22
Total		**183**

This large array of information has been organized and synthesized to address the key study topics. The intent of the analysis is to ensure that each sector receives consistent and fair treatment of its contribution to the provincial economy. In addition, analysis and insights are included, where instructive, for important sub-segments within each sector.

1.4 Report Outline

Readers interested in a particular sector are directed to specific parts of the report.

The SWOT analysis results are presented in four major parts:

- ***Part B Background*** – Section 2 provides an overview of the seafood sector in terms of regulation, industry structure, revenues, employment, and other features. Section 3 examines production patterns, consumer trends, and trade issues in world seafood markets, as well as providing a market and economic outlook. In Section 4, the state of the fisheries resource is addressed, along with some key environmental and sustainability issues (e.g., climate change, the precautionary approach, species at risk legislation).
- ***Part C The BC Seafood Sector*** – Section 5 reviews key issues for the BC fish harvesting industry related to markets, government policies and regulations, human resources, investment and capital, supply chain issues, and industry liaison and relationships. Sections 6 and 7 offer the same for the BC aquaculture industry and seafood processing and distribution, respectively.

- ***Part D The BC Tidal Recreational Fishery*** – Section 8 provides an overview of recreational fishing including regulation, industry structure, revenues, and employment. In Section 9, the fishery's key issues are presented, comparable to those for the seafood sector above.
- ***Part E SWOT Analysis*** – The concluding section 10 discusses the economic contribution of the seafood and recreational fishing sectors, major themes emerging from the analysis, and the summary SWOT results.

The text is supported by a series of appendices. Appendices A through D present statistics and analysis for the three seafood subsectors and the tidal recreational fishery. Appendix E contains information on fish stock assessment. The list of study interviewees is provided in Appendix F. An index follows at the end of the text.

Part B. Background

2.0 SEAFOOD INDUSTRY PROFILE

This section presents an overview of the seafood sector, its major elements, regulatory framework, revenue trends, and employment base. More detailed analysis follows in the remaining sections and appendices of the report.

2.1 *The Seafood Business*

To be viable and adapt to a changing business environment, an industry must know what business it is in and who its real competitors are.

2.1.1 Nature of the Business

The seafood business produces food for consumption by end consumers: retail, food service (restaurant), and institutional. The demands and tastes of these end consumers drive the entire industry. The seafood industry competes with other protein producers, including red and white meat and poultry, on a local, national, and international level. In short, the industry must emphasize the food component of the term seafood and must think globally.

The BC seafood industry must position itself as a global food business.

That seafood is a food business must permeate the thinking and conduct of industry. Food businesses market rather than sell their products; sellers merely fill orders. Marketers identify and stimulate consumer needs, develop products to meet these needs, and establish efficient systems for delivery.

Food businesses have long-term strategic plans, a vision, and strong leadership. They cooperate on high-level policy issues through cohesive industry associations that present a unified voice to consumers, governments, and others. As well, they constantly strive for production efficiencies through investments in new technology and human resources. These characteristics and attitudes frame the competition facing the BC seafood industry.

2.1.2 Industry Elements

Production, processing, and distribution are the three phases common to the food business.

The BC seafood industry produces, processes, and markets fish and shellfish into intermediate or finished food products for consumers. The industry involves several linkages or phases of activity between the natural resource in its marine environment and the final products available to consumers:

- *Production* – Fish and shellfish are harvested using a variety of nets, hooks and lines, traps, diving techniques, or other gear. In addition, they are cultured from birth through rearing and feeding to market size.
- *Processing* – Raw fish and shellfish reach commercial processors via delivery by sea to processing plants, custom unloading at transhipment points, and trucking. Processors transform the raw material into a variety of live, fresh whole, frozen whole, fillet, steak, smoked, canned, roe, and other products.
- *Distribution* – Final processed products are delivered to consumers through wholesale and retail food channels.

These three industry elements also exist for the food business in general.

2.2 Fish Harvesting

There are about 3,000 commercial fishing vessels in BC that hold a total of 7,468 limited entry fishing licences.

2.2.1 Regulatory Environment

The federal Department of Fisheries and Oceans (DFO) is constitutionally responsible for the management of both coastal and inland fisheries. In non-tidal areas, the Province of British Columbia, as the owner of the land, has jurisdiction over property and civil rights in fisheries. Some aspects of the management of non-tidal fisheries have been delegated to the Province by the federal government under several Memoranda of Understanding (see Exhibit 2).

In contrast, in tidal waters, the absolute right to issue, suspend, cancel, and refuse issuance or re-issuance of fishing licences is at the sole discretion of the Canadian Minister of Fisheries and Oceans. DFO also sets annual catch limits or quotas and regulates the fisheries.

DFO, the Canadian Coast Guard, and Transport Canada are all involved in fisheries regulation.

Almost all fisheries have limited numbers of licences and participants. Some fisheries operate under an individual quota (IQ) management system. For the majority, licences are attached to a specific vessel and specify the vessel's overall allowable length (OAL). Licences for competitive fisheries such as salmon permit access to the resource but do not guarantee a specific catch amount. Licences for IQ fisheries such as halibut allow specific catch levels. Almost all licences may be transferred. DFO Pacific Region has a policy against licensing large combination harvester-processor vessels such as groundfish freezer-trawlers.

Commercial fishermen on licensed fishing vessels must possess a valid Fisher Registration Card (FRC) issued by DFO. The Canadian Coast Guard (CCG) regulates safety equipment aboard fishing vessels. Transport Canada regulates the safety of vessels and, more recently, the certification of skippers to operate vessels.

2.2.2 Industry Structure

Most BC fish and shellfish products are sold in world markets where they comprise only a small share of global supply and must compete with products from other countries' fisheries, aquaculture products, and a wide variety of other protein sources such as poultry, red meat, and soy protein. Since pricing is determined in these world markets, the revenues for BC seafood products in any given year may not reflect actual production costs.

BC harvesters are essentially price takers in world markets.

As a result, provincial processors have little control over the prices of most of their products. What consumers are willing to pay determines the prices distributors receive. These, in turn, determine the prices for processors and hence harvesters. Thus, fishermen receive "netback prices" determined by the expected prices of final consumer products less the costs of intermediate distribution and processing. In this way, fishermen bear much of the impacts resulting from changes in retail seafood prices.

In recent years, however, the increasing consolidation and purchasing power of large big-box retailers such as Costco has resulted in price reductions at the wholesale level. These price reductions have not necessarily been passed on to retail consumers.

Exhibit 2: Federal-Provincial Memoranda of Understanding on Fisheries Issues

A: **Devolution of Responsibility 1937**

Agreement giving the Province authority to administer federal regulations for the conservation of fish in non-tidal waters. (Order in Council, P.C. 2532, October 12, 1937)

B: **Other Fisheries Issues 1979-2002**

1. **General Fisheries Agreement (1985) and Subsidiary Agreements:**
    - Fisheries Programs (1986)
    - Fish Habitat Management Activities (1986)
    - Fishery Resource Management Activities (1986)
    - Fishery Resource Enforcement Activities (1986)
2. **Aquaculture**
    - Aquaculture Development (1988)
    - Fish Transplant Committee (1992)
3. **Enforcement/Habitat Protection**
    - Coordination of Fishery Resource Enforcement Activities (1987)
4. **Data Collection**
    - Data Collection on Aquaculture (1988)
    - Fish Disease Database (1995)
5. **Other**
    - Emergency Measures (1982)
    - SEP Steelhead & Cutthroat Trout Contract (1984)
    - Section 33 of the Fisheries Act (1985)
    - Canadian Observers on Japanese Driftnet Squid Boats (1989)
    - Licensing of Inland Commercial Salmon Fisheries (1990)
    - Coordination of Fish Inspection Programs (1991)
    - Skeena Watershed Committee (1992)
    - Coquitlam River Flow Management (1993)
    - Fisheries and Seafood Diversification (1995)
    - Steelhead Habitat Capability Project (1996)
    - Bilateral Review of Pacific Salmon Fishery Roles & Responsibilities (1996)

The industry is resource constrained and generally has no control over the annual supply of raw material. The size and timing of catches are biologically determined. Some species, such as salmon, are only available for harvest for a short duration which affects harvesting, handling, processing practices, and the product mix.

In general, the BC capture fishery lacks vertical integration.

By world standards for fish processing and food manufacturing, most BC fish processing companies are small. BC's capture fishery generally lacks the vertical integration –the integration of harvesting, processing, and distribution functions – that characterizes other BC resource industries such as forestry and mining. There are exceptions though, such as the ownership of salmon fishing vessels by processors.

Not all transactions involve each subsector. Some fishers may sell directly to the final consumer, or the processor may sell directly to the retailer. In other cases, the wholesaler or retailer may further process the product, for example, by steaking headed and gutted whole fish. There are about 3,000 commercial fishing vessels in BC.

2.2.3 Major Fishery Species

The following are the major species groups in the BC capture fishery:

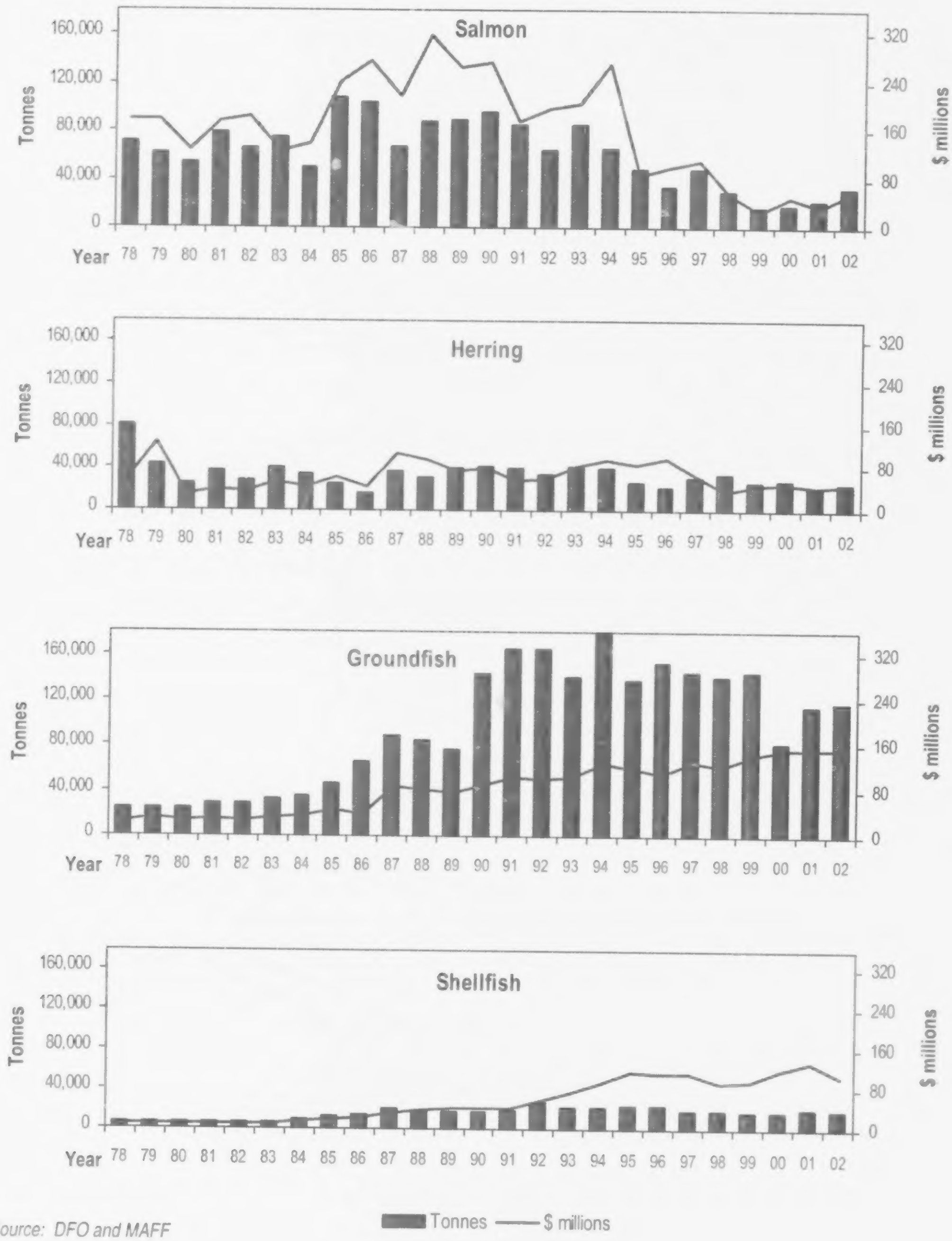
- *Salmon* – Six species of salmon (chinook, coho, sockeye, chum, pink, steelhead) spawn in BC rivers. There are directed commercial, recreational, and First Nations fisheries for the first five species, while steelhead is primarily a non-retention, recreational fishery.
- *Herring and other Pelagics* – Pelagic fish is a general term for species of fish that inhabit the water column, in contrast to groundfish which are found at or near the bottom. Aside from herring, the dominant species in BC, pelagic fish include eulachon, sardine (pilchard), tuna, and several smelt species.
- *Groundfish* – Groundfish is the general term for fish living at or near the seabed. Commercial groundfish species in BC include flatfish (flounder, sole, halibut), rockfish, Pacific cod, sablefish, lingcod, Pollock, and hake. Groundfish are caught by trawl, hook and line, and trap fishing gear. The groundfish trawl fleet lands over 77 species.
- *Shellfish and Invertebrates* – This group comprises a variety of species: geoducks, abalone, shrimp, prawns, Dungeness crabs, red and green urchins, euphausids/krill, sea cucumbers, and scallops. It also includes several intertidal clam species: littleneck, butter, manila, razor, and varnish.

2.2.4 Landings and Landed Value

Trends in landed volume, landed value, and wholesale value for the species groups defined above are shown in Appendix A and Exhibit 3.

	Landed Value ($ millions)				
	Salmon	Herring	Groundfish	Shellfish	Total
1982	183	36	28	9	256
1986	276	46	39	21	382
1990	273	82	90	42	487
1994	260	95	129	93	577
1998	54	37	127	94	312
2002	57	47	153	107	364

Exhibit 3: BC Fish Harvesting Landings and Landed Value by Species Group



Source: DFO and MAFF

Landed values of salmon and herring have fallen significantly over the past decade.

BC's wild salmon fishery has collapsed from an average annual 75,000 tonnes in the early 1990s to less than 50,000 tonnes since 1995. In 1999, the salmon catch reached a historic low of 17,000 tonnes. These catch declines reflect changes in both biological conditions and fisheries management. In the mid-1990s, a regime shift in the ocean environment led to lower ocean productivity, lower rates of ocean survival, and fewer salmon returns.

In response, fisheries management from the late 1990s started to focus increasingly on conservation and selective fishing (the "precautionary approach"), resulting in substantial declines in salmon fishing opportunities. At the same time, salmon prices have collapsed due to increased world supply of wild and farmed salmon. With the combination of catch and price declines, the revenue base of the wild salmon fishery is only 20% of what it was in the early 1990s.

The above catch figures from DFO exclude catch from three types of commercial aboriginal fisheries: Pilot Sales Agreements under the Aboriginal Fisheries Strategy, Excess to Salmon Spawning Requirements (ESSR) surpluses, and Nisga'a Treaty entitlements. The total catches in these fisheries averaged about 0.5 million sockeye (16% of the regular commercial catch) and about 0.5 million other salmon (8% of the regular commercial catch) annually over the 2000 to 2002 period.

	Average Catch 2000-2002 ('000s fish)				
	Sockeye	**Coho**	**Pink**	**Chum**	**Chinook**
Aboriginal Commercial					
Pilot Sales	137	1	37	19	5
ESSR	292	125	27	235	42
Nisga'a	77	6	28	0	1
	506	132	92	254	48
Regular Commercial	3,129	45	5,289	1,388	133

Source: Michelle James, "Native Participation in BC Commercial Fisheries - 2003 ", 2003

Herring catches and prices, too, have declined. Recently, annual catch volumes have been fluctuating in the 25,000 to 35,000 tonne range. Prices have declined as a result of demographic shifts and changing consumer tastes in Japan, as well as the weakening of the Japanese economy and the yen currency. Consequently, the landed value to fishermen is only one-half the level of ten years ago.

With rapid growth, groundfish and shellfish revenues now have the majority share of fishery value.

In contrast, groundfish and shellfish landed value are up significantly and have become much more important to the capture fishery. During the 1990s, groundfish revenues grew with the expansion of the hake fishery and the adoption of individual vessel quota (IVQ) management systems for groundfish trawl, halibut, and sablefish. These systems resulted in better quality fish to market. Today, salmon and herring account for only 25% of the BC capture fishery's landed value, compared to more than 75% fifteen years ago.

2.2.5 Employment and Wages

Fleet rationalization has cut fishing jobs in half from ten years ago.

Today, there are 8,375 commercial fishermen in BC with Fisher Registration Cards, less than half the number of a decade ago. This job loss reflects the salmon licence buyback programs of the late 1990s and other fleet rationalization measures. For example, stacking has allowed vessels to purchase another licence to fish additional areas or to lease additional quota.

Most fish harvesting jobs are seasonal, such that the 8,375 fishing jobs translate into only 3,410 person-years (PYs) of employment. In other words, each fishing job equals 0.4 PY of employment on average (see Exhibit 4). Crew wages, including a wage to the skipper, are estimated at $115 million for 2002, or $33,700 per PY.

2.2.6 Regional and Aboriginal Participation

Aboriginal people account for 25% of total fishing employment.

Over 60% of commercial fishermen live in the regions of Greater Vancouver, Mid-Vancouver Island (Parksville, Qualicum, Comox-Courtenay, Campbell River, Quadra Island), and the North Coast. The aboriginal share of fishing employment is 25% overall, but is higher in the salmon and herring fisheries.

2.3 *Aquaculture Sector*

The aquaculture industry, for the purposes of this study, comprises the hatchery and farming phases of cultured finfish and shellfish production (processing and marketing functions fall under the seafood processing sector). In 2002, there were 576 licensed marine aquaculture farms (121 finfish and 455 shellfish) mostly on Crown land tenures covering 3,918 hectares (1,191 finfish and 2,727 shellfish).

2.3.1 Regulatory Environment

An aquaculture licence must be obtained from the BC Ministry of Agriculture, Food and Fisheries (MAFF) to operate an aquaculture facility in the province. Most BC shellfish and finfish farms are located on provincial aquatic Crown land requiring a tenure (investigative permit, licence of occupation, or lease) from Land and Water BC. Farming operations that also process product must obtain a processing licence from MAFF and must be federally registered with CFIA. The BC Ministry of Water, Land and Air Protection issues waste discharge permits. Additional details on aquaculture regulation are given in Section 6, BC Aquaculture Industry.

In the mid-1990s, the provincial government imposed a moratorium on new salmon aquaculture sites, which was subsequently lifted in September 2002.

Aquaculture or farming is regulated by DFO and the BC Ministry of Agriculture, Food and Fisheries.

DFO is the lead federal agency and oversees the protection of fish and fish habitats. The Department reviews aquaculture applications to ensure the protection of wild fisheries and the marine environment, as well as safe marine navigation. For new aquaculture species, it authorizes access to wild broodstock and seed. The Canadian Food Inspection Agency (CFIA) inspects and approves processing facilities for all farmed shellfish and salmon. Environment Canada oversees water quality monitoring of shellfish growing sites.

Exhibit 4: Estimated Employment and Wages in BC Fish Harvesting 2002

No. of Limited Entry Licences	7,468
No. of Active Vessels	3,000
Employment Measures	
Jobs	8,375
Employment (PYs)	
Skippers	1,440
Deckhands	1,970
Total	3,410
Jobs by Region	
Queen Charlotte Islands	115
North Coast	1,025
Central Coast	195
North Vancouver Island	550
Mid Vancouver Island	1680
South Vancouver Island	930
West Coast Vancouver Island	380
Victoria & Area	545
Sunshine Coast	545
Vancouver & Other	2,410
Total	8,375

Employment by Species Group (PYs)	
Salmon	950
Herring	300
Groundfish	830
Shellfish	1,330
Total	3,410
Aboriginal Share of Employment	25%
Wages and Benefits	
Crew Wages (including skipper)	$115 million
Wages and Benefits per PY	$33,700

Notes:
1. *Jobs equals the number of Fisher Registration Cards (FRCs).*
2. *PYs is person-years.*
3. *PY = no. of active vessels x average crew size x weeks fished / 30, i.e., 30 person-weeks fishing assumed to equal one PY.*
4. *Aboriginal share of employment is approximate and varies by fishery, i.e., aboriginal share is higher than 25% for salmon and herring fisheries and is lower than 25% for other fisheries.*

Source: GSGislason & Associates Ltd. estimates (see Exhibit A.1, Appendix A).

2.3.2 Industry Structure

While aquaculturists also face world prices, they can control their supply.

Unlike the capture fishery aquaculture, as a form of animal husbandry is not constrained by limited fish resources. However, it is subject to the availability of growing sites and, in some cases, markets. The aquaculture production cycle is closed, with farmed fish and shellfish being reared from the egg stage to a product ready for market. Further, the industry can expand production to the limit of market demand, given sufficient access to suitable marine environments. Thus, aquaculturists have significant control over the timing and quality of products sent to market.

Aquaculture is more vertically integrated than the capture fishery.

Vertical integration is more common in aquaculture, especially salmon farming, than in the capture fishery although there are also numerous small growers of oysters and clams. Most salmon farming companies have their fish custom-processed, or operate their own processing plants. This means that salmon growers usually retain ownership of their products until they are sold.

Five salmon farming companies – Heritage Salmon, Mainstream (formerly PNA), Marine Harvest, Omega, and Stolt Seafarms – comprise over 80% of BC farmed salmon production. Heritage is a Canadian company, while the others are large European multinationals. All five farm salmon in other parts of the world such as Norway, Chile, the United Kingdom, New Brunswick, and the US (Maine).

2.3.3 Production and Farm Gate Values

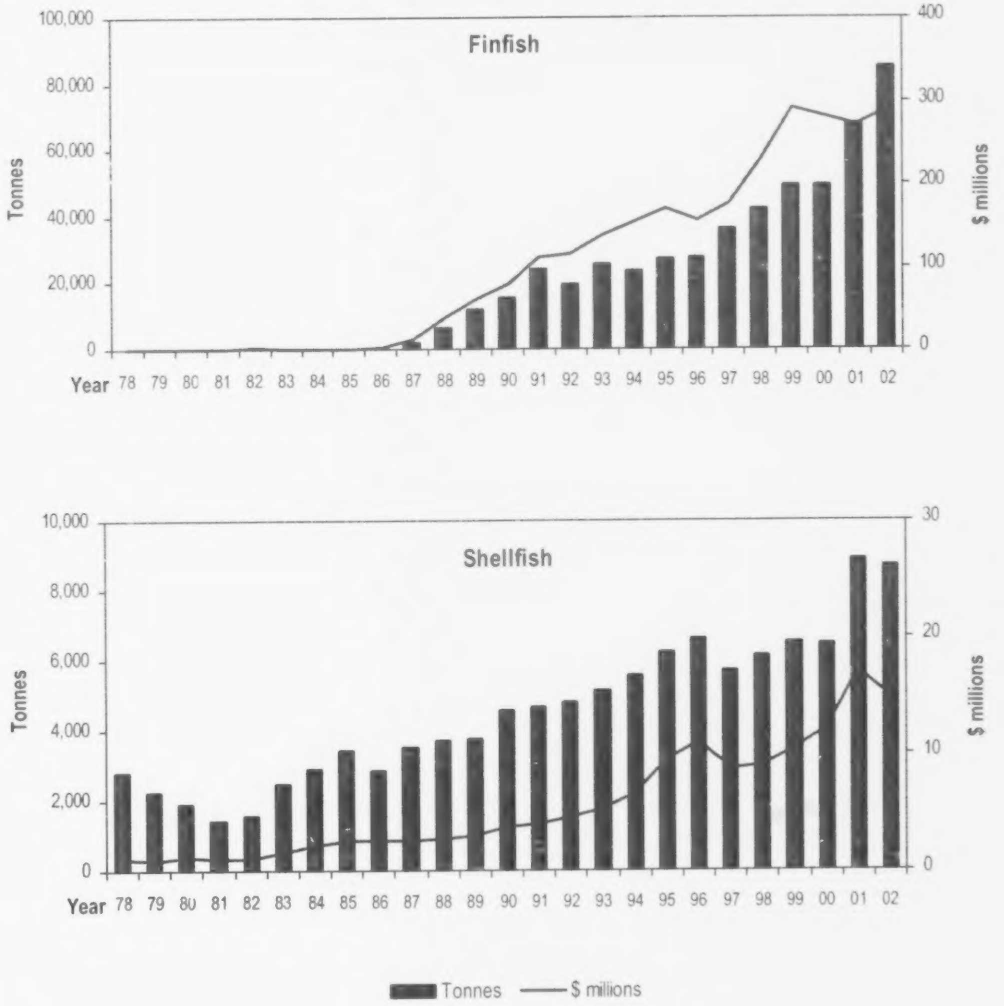
The industry can be segmented by two species groups: farmed finfish – primarily salmon (Atlantic, chinook, coho) – and shellfish (Pacific oysters, Manila clams, Japanese scallops). Several other species are in various stages of development.

Aquaculture is dominated by salmon farming, which has grown rapidly since the 1980s.

Today, farmed salmon dominates BC aquaculture production (see Exhibit 5 and Appendix B). In the late 1970s, aquaculture production consisted almost entirely of oysters, amounting to about 2,500 tonnes annually. At that time, the farmed salmon industry was in its experimental phase, with annual production below 100 tonnes. The 1980s saw tremendous growth in techniques and technology, so that by the latter part of the decade farmed salmon production had reached 10,000 tonnes annually. In 2002, production totalled 85,400 tonnes, the vast majority of which was Atlantic salmon. Other species produced include chinook, coho, and steelhead trout.

	Farm Gate Value ($ millions)		
	Salmon	Shellfish	Total
1982	1	1	2
1986	3	2	5
1990	78	4	82
1994	154	6	160
1998	229	9	238
2002	289	15	304

Exhibit 5: BC Aquaculture Production and Farm Gate Value by Species Group



Source: DFO and MAFF

The production of shellfish also grew over the same period. BC continues to produce oysters as well as Manila clams, the latter first farmed in the late 1980s, and other species. The early 1990s saw the beginnings of scallop farming, with production still somewhat limited. Geoduck and mussel culture has also begun.

Increased supply and competition have lowered farmed salmon prices.

Farmed salmon prices have declined in recent years, due to increases in world supply and competitive forces. In particular, the year 2001 was very difficult, as substantial Chilean salmon imports to the US caused price declines of 30% and more to producers.

The margin between wholesale value and farmgate/harvest value is much narrower for aquaculture than for most capture fisheries. The aquaculture sector sells the majority of its products in fresh whole form, although processing of farmed salmon into fillets and portions is increasing. In addition, the industry's substantial vertical integration means that many producers report identical wholesale and farmgate values. That is, there is no identifiable ownership transfer at the farmgate.

2.3.4 Employment and Wages

The growth in farmed salmon production in the late 1990s was fuelled by more intensive use of existing sites. Expansion into new sites was restricted by the moratorium on new tenures for much of the decade.

Salmon farming jobs are typically full-time and year-round and shellfish jobs generally seasonal.

Technological change, including automatic feeding systems and improved farming practices, has reduced on-farm labour requirements for farmed salmon. Farming and processing of shellfish is more labour-intensive than for farmed salmon. Most salmon farming jobs are full-time and year long, while farmed shellfish employment tends to be seasonal.

Total aquaculture employment is estimated at 1,730 person-years.

Total employment at the farm level is estimated at 1,410 PYs in finfish and 320 PYs in shellfish. These figures exclude important industry activities such as processing, marine transport, and marketing as well as employment in directly related suppliers (e.g., cage and packaging manufacturers, fish health). The total farm wage bill was $58 million in 2002. Wage rates are higher in salmon farming than in shellfish farming.

2.3.5 Regional and Aboriginal Participation

Essentially, all aquaculture jobs are located outside the metropolitan areas of Greater Vancouver, and Greater Victoria (see Exhibit 6). Salmon farms and their associated employment are concentrated on North Vancouver Island. Shellfish farming jobs are concentrated in Mid-Vancouver Island, including the important Baynes Sound area.

The aboriginal share of aquaculture employment is around 18%.

The aboriginal share of the workforce is growing, estimated 20% in salmon farming and 10% in shellfish farming and 18% overall. Several members of the Kitasoo, Ahousaht, and Quatsino First Nations are employed at salmon farms.

Exhibit 6: Estimated Employment and Wages in BC Aquaculture Farm Level 2002

		Finfish*	Shellfish	Total*
No. of Sites				
Licensed		121	455	576
Active		80	340	420
Licensed Hectares		1,191 ha	2,727 ha	3,918 ha
Employment Measures				
Jobs		1,600	800	2,400
Employment (PYs)		1,410	320	1,730
Employment by Region (PYs)				
North Vancouver Island		745	5	750
Mid Vancouver Island		340	200	540
South Vancouver Island		30	15	45
West Coast Vancouver Island		230	40	270
Sunshine Coast		65	60	125
	Total	1,410	320	1,730
Aboriginal Share of Employment		20%	10%	18%
Wages and Benefits				
Wages and Benefits		$50 million	$8 million	$58 million
Wages and Benefits per PY		$35,500	$25,000	$33,700

Notes:
1. *Jobs are estimated (and exclude processing, transport, marketing functions as well as industry suppliers).*
2. *PY is person-year – finfish PY estimated based on 16.5 PYs per 1,000 tonnes production; shellfish PYs estimated based on 36.5 PYs per 1,000 tonnes production (both derived from MAFF surveys).*
3. *Employment and wages and salaries measures include hatchery operations.*
4. *Aboriginal share is approximate.*
5. *North Vancouver Island includes North Coast, Central Coast, and Upper West Coast Vancouver Island*

Source: GSGislason & Associates Ltd. estimates.

2.4 Seafood Processing

There are approximately 182 active fish processing plants in BC with 167 processing capture products and 66 processing aquaculture products (51 process both).

2.4.1 Regulatory Environment

Fish processing is regulated by the MAFF, CFIA, Environment Canada, and the BC Centre for Disease Control.

Once wild fish and shellfish are caught and landed, they become private property. The buying, processing, and selling of fish falls under provincial jurisdiction. The Ministry of Agriculture, Food and Fisheries licenses fish processing plants, fish buying stations, fish brokers, and fish vendors. It also licenses harvesters of wild oysters and marine plants. A Fish Buying Station Licence must be obtained from MAFF for each vessel, vehicle, and shore station that receives fish directly from commercial fishermen.

The Canadian Food Inspection Agency (CFIA) requires the registration and inspection of processing facilities where fish are prepared for export outside BC or Canada, facilities where bivalve shellfish or farmed fish are processed, and canning or retorting operations. Environment Canada oversees water quality monitoring of shellfish harvesting sites. Commercial fishing vessels used as fish buying stations must also have a Fish Hold Inspection from CFIA and a commercial fishing licence from DFO. The CFIA, Environment Canada, and DFO, which regulates shellfish growing and harvesting areas, jointly administer the Canadian Shellfish Sanitation program (CSSP).

Individuals or companies processing fish or aquatic plants require a Fish Processing Licence from MAFF. Facilities with a Fish Processing Licence do not require a separate Fish Buying Station Licence for that location if their processing licence covers the product being received. Individuals or companies purchasing fish directly from commercial fishermen for resale must have a MAFF Fish Broker Licence. Food Protection Services of the BC Centre for Disease Control inspects processing facilities where fish are prepared for sale in the province. MAFF inspects facilities where marine plants or sport caught fish are exclusively processed.

2.4.2 Industry Structure

The processing of imported fish has been increasing recently.

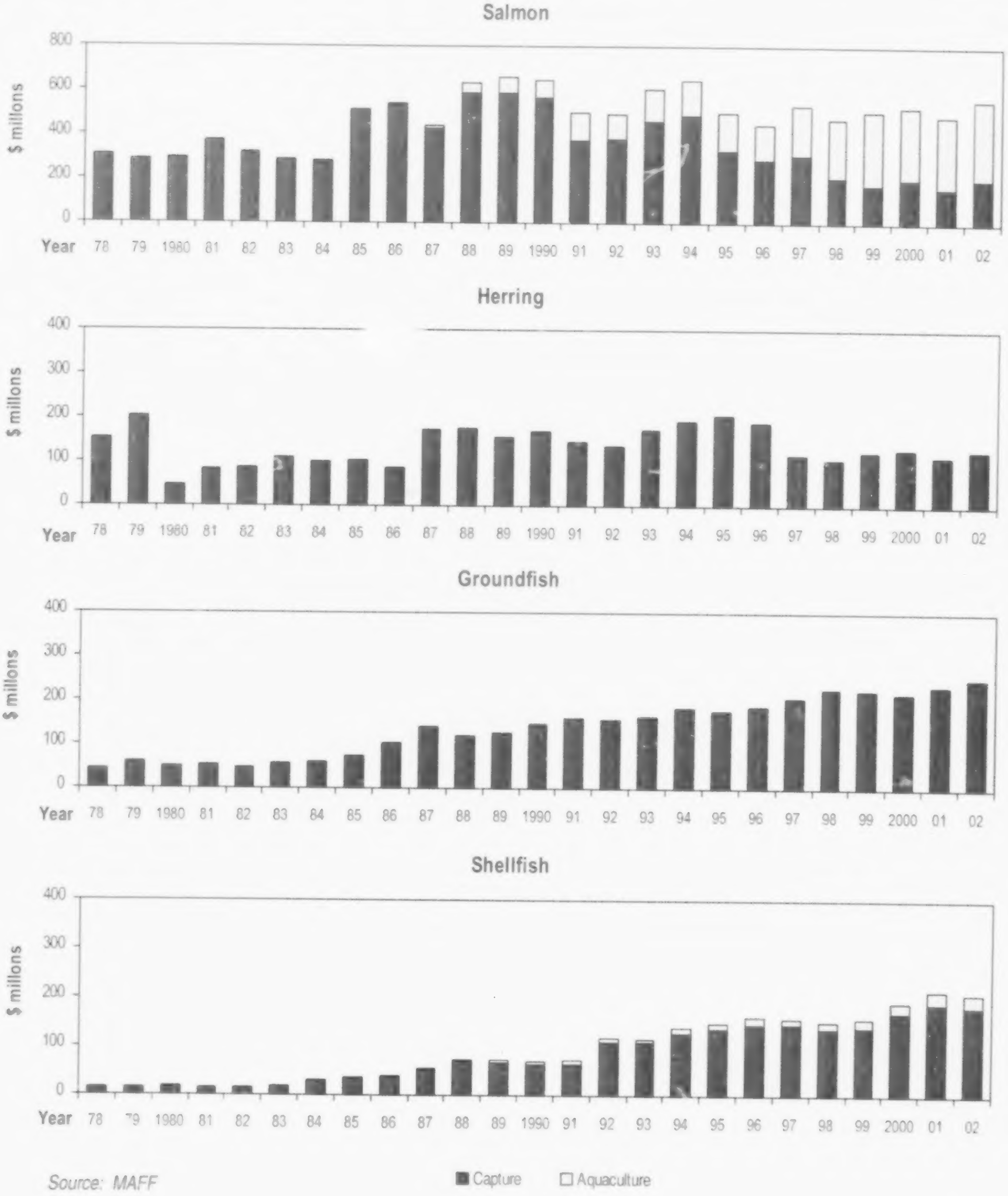
Processors use both domestic and imported raw material, with the latter increasing over time. For example, due to the significant declines in BC salmon catches, processors have purchased more Alaskan salmon. More recently, value-added processors have been importing frozen farmed salmon from Norway and Chile to produce smoked and other niche products. Some plants have in-house staff selling the processed products, while others use brokers who sell the fish on a consignment basis.

The processing sector has consolidated significantly since the early 1990s.

There has been significant consolidation in capture fish processing over the past 15 years. For example, JS McMillan Fisheries closed its 100-year-old plant in Prince Rupert in the early 1990s, and acquired the Prince Rupert Fishermen's Cooperative Fairview plant in 1995. BC Packers, once the province's largest fish processor, sold the company's fishing and processing assets to the Canadian Fishing Co. (Canfisco) in 1999.

Since 1990, several large farmed salmon processing plants have been built on Vancouver Island. These include Brown's Bay (Campbell River), Englewood Packing (south of Port McNeill), and Alpha (Port Hardy). These plants typically process salmon from only one or two companies covering several farmsites. The two largest farmed shellfish processing plants – Fanny Bay Oysters and Mac's Oysters – are located at Fanny Bay in Mid-Vancouver Island.

Exhibit 7: Wholesale Value of BC Seafood by Species Group



Salmon

Herring

Groundfish

Shellfish

Source: MAFF

Economic activity in the capture fishery is generated by multiple transactions between financially independent harvesters, processors, and distributors. Harvesters from 3,000 BC vessels sell to about 180 provincial processors. Processors, in turn, sell their products to thousands of distributors worldwide, who then sell fish and shellfish to millions of consumers. Four companies – Canfisco, Ocean Fisheries, Bella Coola Fisheries, and JS McMillan Fisheries – purchase and process well over half of the BC salmon and herring catches.

There is significant diversity in species and product focus of BC capture seafood companies. Apart from the four major companies identified above, other companies such as Aero Tradiing, North Sea Products, and Walcan are significant players in salmon and herring. Several specialized groundfish operations exist, e.g., RH Wholey, Ucluelet Seafood Processors, and Port Fish for hake surimi, fillets, and headed and gutted, and Fisher Bay Seafood for groundfish fillets. (Ocean Fisheries and JSM McMillan also have major groundfish filleting operations.) Some buyers such as Kelsey Bay specialize in live groundfish. There are also a multitude of processors that specialize in shellfish including Evergreen, Sea World, Kiku, Best Honour, and TriStar. Calkins and Burke and Albion Fisheries are major distributors.

2.4.3 Processing (Wholesale) Value

All of the growth in seafood exports since the late 1980s has come from aquaculture products.

The primary markets for the BC capture fishery are the US, accounting for half of seafood wholesale values, followed by Japan. Only 13% of BC seafood is consumed in Canada. Exports of seafood products from the capture fishery have been flat, with growth in seafood exports since the late 1980s attributable primarily to aquaculture products. Exhibit 7 shows wholesale values for the seafood industry by species group.

	Wholesale Value ($ millions)		
	Capture	Aquaculture	Total
1982	464	3	467
1986	763	7	770
1990	943	90	1,033
1994	994	168	1,162
1998	680	280	960
2002	759	388	1,147

The US is the primary market for BC's fishery and aquaculture products.

The US market has become more important in terms of value and export share over the past 15 years. This dramatic growth has resulted from increased exports of fresh farmed salmon, fresh whole halibut, groundfish fillets, and shellfish products. In contrast, export sales to Japan (e.g., frozen whole salmon, herring roe) and to the European Union (e.g., canned salmon) have declined.

More than half of BC farmed salmon and shellfish is sold in the US, particularly along the I-5 corridor to Washington, Oregon, and California. The traditional farmed salmon product for sale has been dressed whole head-on fish. Increasingly, however, fillets, portions, and smoked products are being produced.

Exhibit 8: Estimated Employment and Wages in BC Seafood Processing 2002

No. of Active Plants	
Processing Capture Products	167
Processing Farmed Products	66
Total	182*

Employment Measures	
Jobs	9,100
Employment (PYs)	
Administrative	785
Production & Other	4,905
Total	5,690

Employment by Region (PYs)	
Queen Charlotte Islands	50
North Coast	480
Central Coast	50
North Vancouver Island	495
Mid Vancouver Island	770
South Vancouver Island	210
West Coast of Vancouver Island	325
Victoria and Area	135
Sunshine Coast	50
Vancouver and Other	3,125
Total	5,690

Employment by Operation Type (PYs)	
Self-Processing	3,945
Custom Processing	1,745
Total	5,690

Employment by Species Group (PYs)	
Wild or Capture	
Salmon	1,635
Herring	660
Groundfish and Other Finfish	1,225
Shellfish	515
Total Wild	4,035
Farmed	
Salmon	1,405
Shellfish	250
Total Farmed	1,655
Total	5,690

Aboriginal Share of Employment	30%

Wages and Benefits	
Wages and Benefits	$202 million
Wages and Benefits per PY	$35,500

** 51 plants process both capture & farmed products.*

Notes:

1. *Self-processors are companies that process their own fish and shellfish i.e., seafood that they own. Custom processors are companies that process other companies' fish and shellfish on a fee-for-service basis i.e., seafood that they do not own.*
2. *Jobs is the sum of peak monthly employment for each of the plants.*
2. *PYs is person-years (the sum of monthly employment divided by 12).*
3. *Benefits estimated at 25% of T4 wages*
4. *Employment and wages and salaries measures include activity from processing imported raw material (e.g., salmon imported from Alaska and Norway, herring imported from Alaska).*
5. *Processing employment excludes truck and marine transport employment, but includes secondary processing*
6. *Aboriginal share of employment is approximate.*

Source: Estimates by GSGislason & Associates Ltd. based on the Processor Employer Survey 2002 by MAFF.

	Export Value ($ millions)				
	US	Japan	EU	Other	Total
1990	209	347	166	54	776
1994	331	391	83	91	896
1998	447	203	61	94	805
2002	676	195	43	89	1,003

These export values derive from Statistics Canada information. However, the Statistics Canada data values farmed salmon exports at a price 40% or greater than what BC farmed salmon companies report in their Annual Fisheries Production Schedules (AFPS) to MAFF. (Statistics Canada also, reports very little price decline since 2000, but both the AFPS and interviews conducted for this study suggest a 30 to 40% price decline.)

To expand shellfish markets, industry must educate consumers on safety and quality issues.

Markets are flat for shucked oysters. As a result, many producers are shifting to the production of live oysters in the shell that receive price premiums due to their increased popularity. The market for clams sold in the shell has been strong and growing.

2.4.4 Wages and Employment

Processing employment totals about 5,690 person-years.

The BC processing sector currently has 5,690 person-years of employment from 9,100 jobs (see Exhibit 8). The processing sector wage bill (including benefits) was $202 million in 2002. There are many seasonal and part-time jobs in plants that specialize in processing wild salmon and herring. In contrast, most jobs at farmed salmon and groundfish processing plants are full-time, year-round jobs.

Employment in custom processing plants is 30% of this total and growing. (Custom processors process other companies' fish on a fee-for service basis.) The split between jobs processing wild versus farmed fish is about 70:30 with the farmed share growing over time.

2.4.5 Regional and Aboriginal Participation

The processing industry is concentrated in the Lower Mainland. However, processing employment on North Vancouver Island (Port Hardy, Port McNeill) and Mid Vancouver Island (Campbell River, Quadra Island) is significant, following the construction of several plants during the 1990s expressly to process farmed salmon. There are several surimi processing plants in Ucluelet and Port Alberni on the West Coast of Vancouver Island. Prince Rupert on the North Coast is a regional processing centre for wild harvests, and fish processing is very important to the local economy.

About 30% of total processing employment is aboriginal.

The aboriginal share of processing employment coastwide is estimated at 30%. However, the share is much higher in Prince Rupert (60%).

3.0 WORLD SUPPLY AND MARKET CONDITIONS

BC seafood production is primarily an export industry that competes with other seafood producers from around the world. It is affected and shaped by broad industry trends, consumer and market preferences, and regulatory and trade issues.

The discussion that follows draws on a variety of sources, including: a seafood market survey conducted for this study (GSGislason & Associates 2003); a seafood market report prepared for the Office of the Commissioner for Aquaculture Development (HM Johnson & Associates 2002); a recent book on international seafood trade (Anderson 2003); and an analysis of international seafood trade and non-trade barriers (OECD. *Liberalising Fisheries Markets: Scope and Effects*, 2003).

3.1 Worldwide Supply and Production Patterns

Aquaculture has accounted for almost all of increased fisheries production since the late 1980s.

World fisheries production, both capture and aquaculture, reached 142 million tonnes in 2001, up from 100 million tonnes in 1987 (see Exhibit 9). Virtually all of the increase in fisheries production since the late 1980s can be attributed to the growth in aquaculture production.

Of the 2001 production, 94 million tonnes came from the capture fishery and 48 million tonnes came from aquaculture. More than half of total world aquaculture production is finfish. The Food and Agriculture Organization (FAO) of the United Nations estimates global fish supply at 13.1 kg per capita in 2000 (FAO 2002).

3.1.1 Capture Fisheries

BC has a very small share of global capture production.

China's fisheries account for about 20% of world capture production. Other top producing countries include Peru, Japan, the United States, Chile, Indonesia, Russia, and India. Canada's production, at about 1 million tonnes, is 1% of the world total. BC's production of 0.2 million tonnes is 0.2%.

The major species harvested in capture fisheries are anchovies, pollock, herring, tuna, and mackerel. Salmon, with harvests totalling about 0.84 million tonnes in 2001, does not rank in the top ten species (see Exhibit 10). BC produces about 3% of world salmon supply.

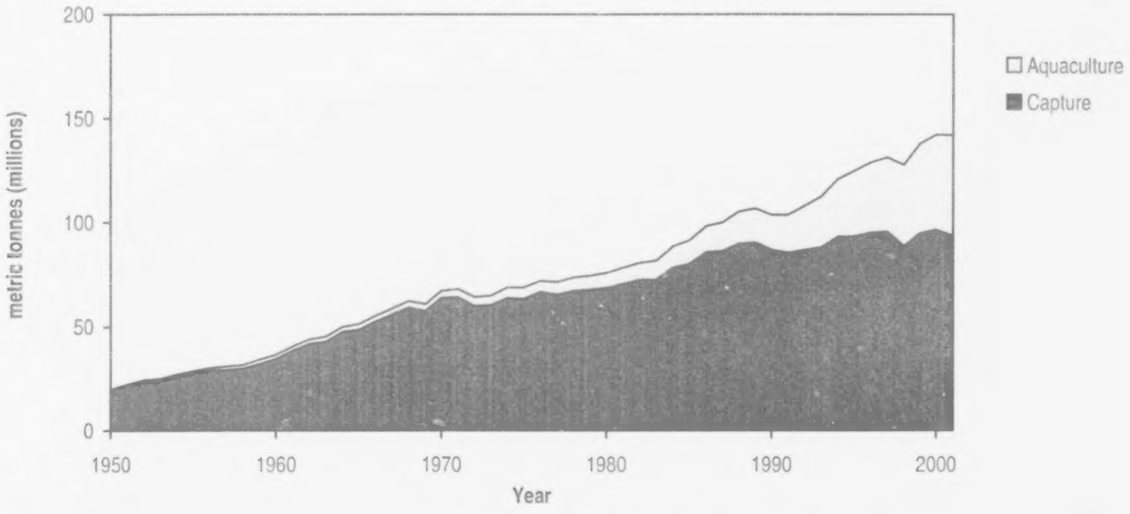
Most of the increase in capture fisheries in recent years has come from fisheries in the Southeast Pacific, with other Pacific areas showing decreasing catch trends. However, there are growing concerns about the reliability of seafood production statistics, particularly those from China.

3.1.2 Aquaculture Production

Increased world seafood supply will come from aquaculture.

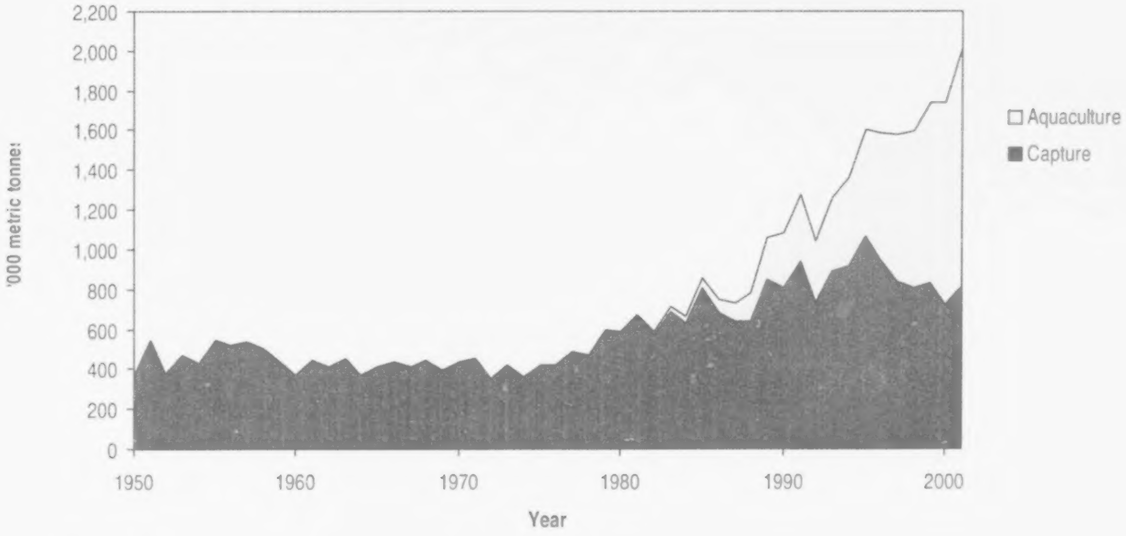
FAO predicts that total seafood demand will reach 160 million tonnes or more by 2030 (FAO 2002). According to the FAO, capture fisheries have peaked and cannot be expected to contribute additional quantities to the world seafood supply. Therefore, new seafood supplies must come from aquaculture. Currently accounting for one-third of all seafood landed globally, aquaculture may comprise more than one-half of global fish consumption by 2030.

Exhibit 9: World Fisheries Production - 1950 to 2001



Source: FAO

Exhibit 10: World Salmon Production - 1950 to 2001



Source: FAO

Globally, BC is also a small aquaculture producer.

China is the world's leading aquaculture producer, with current production exceeding 25 million tonnes annually (and dominated by carp for the domestic market). Other leading producers – India, Indonesia, Thailand, Bangladesh, and Vietnam – each produce no more than three million tonnes per year. Canadian production (0.2 million tonnes) and BC production (0.1 million tonnes) are minuscule relative to the global total.

World aquaculture is dominated by carps, oysters, salmonids, scallops, and tilapia. Total production of farmed Atlantic, chinook, coho and other salmonids has grown dramatically from almost zero in 1980 to about 1.2 million tonnes today. BC produces about 5% of the global farmed salmon supply. Chile and Norway both produce in excess of 300,000 tonnes of farmed salmon annually.

3.1.3 Production Trends

Refrigeration and Transportation Technology

Prior to the mid-20th century, food production and consumption were primarily functions of location. Since then, refinements in refrigeration technology and reductions in transportation costs, combined with trade liberalization and harmonization, have encouraged global production and distribution of food products. Consumers are able to purchase food products originating from different continents or hemispheres depending on season, product availability and market demand.

Refrigeration and transportation improvements have aided globalization of food production.

Advances in technology and transportation have helped increase world trade in perishable food products. Shippers can deliver perishable products to consumers thousands of miles away, with little loss of freshness and quality, and at lower and lower prices. Innovations in handling and advances in packaging methods can maintain product freshness and quality. For example, individual quick freezing (IQF) of small products, such as shrimp and scallops that have a tendency to clump, locks in moisture and allows for easier portioning and thawing.

Another innovation is modified atmosphere packaging (MAP), packaging that replaces air with carbon dioxide or other gases to inhibit the growth of bacteria. MAP, together with careful temperature control, can increase the shelf life of seafood by two to three times, and can help send fresh product to the market or consumer in better condition.

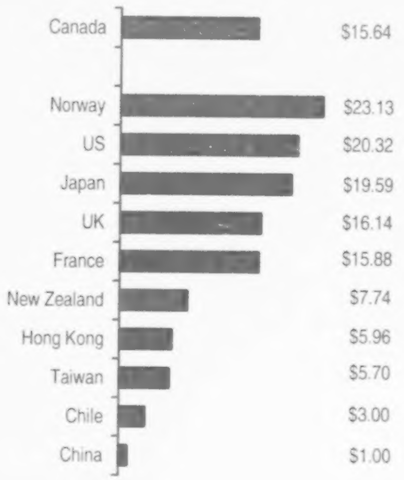
Seafood Processing

Processing, too, is being globalized.

Processing is also becoming a global phenomenon. Better refrigeration and transportation technology means that processing no longer needs to occur close to harvesting locations. For example, China has emerged as a major fish processing nation. Raw material from anywhere in the world can be frozen and shipped to China, where the product is thawed, processed in labour-intensive plants and refrozen for shipment back to North America at competitive prices. Some North American processors, such as Fisheries Products International (FPI), are also using imported frozen raw material. The quality and acceptability in the marketplace of such twice-frozen seafood is growing.

Low wages and an enormous labour supply give Southeast Asia and China in particular a significant cost advantage over North America in labour-intensive manufacturing processes. This applies not only to seafood but also textiles, electronic equipment, toys and other manufactured goods.

International Manufacturing Hourly Compensation 2001 ($US)



Wage rates for China and Chile are estimates

Source: US Department of Labor, Bureau of Labor Statistics.

Value-Added Production

Value-added seafood products are growing in the marketplace.

Value can be added to seafood through further processing to create products that offer consumers greater convenience and/or a greater range of product choices. Value-added products can range from simply portioned seafood (e.g. salmon fillets) to more processed products, such as seasoned portions, smoked salmon, surimi and crab cakes.

The poultry industry has embraced the concept of value-adding. Twenty-five years ago, almost all chicken was sold as whole eviscerated birds. Today, whole birds are a minor share of sales with portions, nuggets and other traypack items dominating the market.

Many attempts at value-added production fail.

At the same time, there are numerous marketing challenges to value-added products, including the tremendous competition and cost to gain shelf space in supermarket outlets. Most attempts to add value to seafood products actually result in additional cost to the producer and ultimately do not succeed in the marketplace (HM Johnson & Associates 2002). Producers often fail to understand the size of the market, the appropriate market segment(s), and/or consumer preferences.

Packaging can add value to food products.

Value-adding can also entail packaging, with minimal to no traditional processing of the product. For example, BC Hothouse, the main marketing arm for the BC vegetable greenhouse industry, emphasizes packaging for their whole product lines (e.g., blister packs of tomatoes on the vine and "stop light packs" of red, yellow, and green peppers). Packaging provides an opportunity for branding.

In the case of seafood, live shipments of fish and shellfish to market (e.g., live geoducks to Hong Kong, live rockfish to the Pacific Northwest) constitute value-added, even though the fish products do not change form.

Competition

Seafood producers face highly competitive markets.

Markets have become much more competitive especially for producers still selling commodity products. Global food distribution has changed significantly, with substantial consolidation at the food distribution and retail levels. Retail discounters and wholesale clubs such as Costco have emerged, own label brands by retailers have become more important, and the balance of power has shifted from food manufacturers to food retailers. The result has been increasing price pressures and squeezing of margins for food manufacturers and producers.

There is greater competition for "centre-of-the-plate" protein. Many large broadliners, such as SYSCO and Tyson, sell a whole array of protein products and not just seafood. Although each protein line has different attributes, purchase decisions are increasingly made on the basis of consistency of availability, quality and price.

Cooperation

To supply final consumers with food products of consistent volume and quality, and at competitive prices, requires cooperation between agents in the value chain (i.e., harvesters/growers, processors, wholesalers and retailers). One form of cooperation is vertical integration and ownership of business at different stages of the chain. Others are forward supply contracts and the formation of producer groups and marketing organizations. Poultry producers generally have much greater value chain cooperation than do seafood producers, especially those in capture production.

Branding of Seafood

A lack of packaging makes seafood branding difficult

Most food branding occurs for packaged goods. Branding involves delivering a product that matches the image or promise one is trying to convey. The development of a brand without consistent supply and quality as well as product grading, is extremely difficult. For these reasons, with a few exceptions (e.g., Gold Seal and Highliner), branded seafood products are rare.

Self-Service at Retail

Self-service and "case ready" seafood are growing in popularity.

Traditional supermarkets and retailers are under tremendous pressure to compete with the low prices and margins of discount chains such as Costco and Wal-Mart. The clear trend is towards more self-service and "case ready" seafood. Self-service cuts labour costs and in-store space requirements, and creates the need for packaged seafood. Packaging, in turn, creates labelling and branding opportunities and facilitates product traceability and adherence to regulatory requirements (see Sections 3.3.3 and 3.3.4).

3.1.4 Trade Patterns

Currently, a third or more of the global seafood supply is traded internationally.

International Exports

BC's share of global seafood exports has fallen.

Total international seafood exports grew by $US 39.4 billion between 1980 and 2000. Canadian exports grew by $US 1.7 billion, and BC exports by $ 0.3 billion, over the same period. As a result, both Canada's and BC's rankings among world seafood exporters have fallen during the past two decades.

	Seafood Exports ($ US billions)		
	1980	1990	2000
BC	0.4	0.8	0.7
Non-BC	0.7	1.4	2.1
Canada	**1.1**	**2.2**	**2.8**
Chile	0.3	0.9	1.8
China	0.3	1.3	3.7
Denmark	1.0	2.2	2.8
Indonesia	0.2	1.0	1.6
Norway	1.0	2.1	3.6
Thailand	0.4	2.3	4.4
US	1.0	3.0	3.1
Other	10.1	20.4	31.0
Total	15.4	35.4	54.8

The countries showing the largest growth in exports are those with significant aquaculture sectors – for example, Norway (salmon), Chile (salmon), China (tilapia and carp) and Thailand (shrimp) – or those conducting significant seafood processing of imported raw material (e.g., China, Indonesia, Denmark).

International Imports

Canada is a net seafood exporter.

The largest seafood importer is Japan ($US 15.7 billion in 2000), followed by the US ($10.6 billion). Currently, the value of Canadian seafood exports ($US 2.8 billion) is double that of Canadian seafood imports ($US 1.4 billion). Thus, Canada is a net exporter, with a positive merchandise trade balance in seafood. In contrast, the US is a net importer and its seafood trade deficit is growing over time.

3.2 Consumer Trends

3.2.1 Demographics and Food Trends

Population Growth

Future demand for seafood is expected to grow with population and rising incomes in developing countries. FAO estimates that given current fish consumption patterns an additional three million tonnes of fish will be required annually to meet the demands of increasing world population.

Population Aging

Health benefits from seafood are appreciated by older people, and increasingly by younger consumers.

An aging population in North America and in Europe is spurring seafood consumption, as older people tend to consume healthier foods, including fruits, vegetables, and seafood. Awareness of the health benefits of seafood consumption is growing even among younger consumers. Increased consumption of seafood high in omega-3 fatty acid has been shown to help reduce high blood pressure, ensure a healthy heart, and develop and maintain brain functioning.

Consumer Awareness of Healthy Foods

Consumers are placing more value on fresh, quality food products.

Consumer awareness and interest in fresh, quality food products is also on the rise due in part to the popularity of television cooking shows, celebrity chefs, and health and nutrition books. Improvements in transportation and the demands of growing and diverse immigrant populations in North America have helped to ensure that a wider range of international food products, including fresh and frozen seafood, is readily available in the market. For example, the growing Asian population in North America has led to increased sales of live seafood in restaurants and supermarkets.

Convenience

Smaller families, two working parents, greater urbanization and a faster pace of life mean that consumers are pressed for time. Busy consumers are looking for fresh chilled fish products and for a variety of higher-valued, more processed products that are easy to prepare and serve (e.g., "heat and serve" protein, bagged pre-cut vegetables). This applies not only to the home consumer but also to institutions and restaurants that are having difficulty in finding workers and need food that is ready to cook or serve.

Higher Personal Incomes

Income levels are rising rapidly in many developing countries and, consequently, consumption of seafood (and other proteins) is growing. With higher incomes, consumers are also placing greater emphasis on convenience and making more food purchases away from the home.

Modernization is changing Chinese seafood consumption.

For example, the recent boom in China's economy is changing the way consumers buy seafood. Traditionally, Chinese consumers shopped at open-air markets or "wet-markets" for fresh fruits and vegetables and live seafood for cooking later in the same day. Now, urban dwellers are acquiring refrigerators and microwaves in the move to modernization. Updated food distribution systems are also changing the Chinese diet, with supermarkets offering more processed and convenient fare but fewer live fish and animals.

Changing Consumer Tastes

Consumer tastes have changed in Japan.

The Japanese seafood market has shifted resulting in long-term repercussions for the industry. Consumer tastes have changed, with a growing preference for red meat and the acceptance of farmed fish as a substitute for wild fish. Younger people have different tastes and consumption patterns than their parents. The country's continuing weak economy has also adversely affected prices.

In North America, per capita consumption of red meats has fallen while consumption of pork and poultry is much higher than 25 years ago. Per capita fish and seafood consumption has been generally flat, although consumption has increased for some products (e.g., salmon) and decreased for others (e.g., cod) over the past decade. Battered fish sales are down while sales of fresh fish, boneless portions and fillets are up.

3.2.2 Quality and Safety

Food Quality

Quality and safety considerations are high on the list of consumer preferences. Consumers are increasingly choosing fresh fish over frozen product and seeking out local foods as much as possible. In almost every survey of seafood consumers, fresh is preferred to frozen (see for example Belknapp ASMI 2000).

This interest is also driven in part by the popularity of television cooking shows and the growing appreciation of healthier foods. In addition, there is greater demand for quality assurance and date stamping of products to ensure freshness.

At the same time, there is also significant consumer demand for high quality frozen products and products made from previously frozen raw material,e.g., packaged, ready-to-cook convenience items.

Food Safety

Concern for food quality and safety has heightened following the outbreaks of bovine spongiform encephalopathy (BSE), or "mad cow" disease, first in the UK and Europe and then more recently cases in Canada and the US. These highly publicized incidents may lead to lasting changes in consumer perceptions and food purchasing patterns.

Markets are demanding tougher food safety standards and product traceability

Food safety risks include drug and pesticide residues, food additives, pathogens (e.g., bacteria, viruses, parasites, fungi), environmental toxins (e.g., lead, mercury) and persistent organic pollutants (e.g., dioxins). Although scientists generally consider food safety risks to be low, consumers in developed countries are demanding more stringent food safety standards while at the same time requiring a wide variety of internationally traded products. Food safety issues are also leading to greater requirements for product traceability and country-of-origin labelling (see Section 3.3).

3.2.3 Sustainability and Other Environmental Issues

Consumers, especially in developed countries, are also increasingly concerned about environmental sustainability, biotechnology and other issues related to the sources and handling of their food.

Seafood Lists

Listing of unsustainable seafood products can be arbitrary and misleading.

In supermarkets and restaurants, a growing number of consumers are carrying lists of seafood species (e.g., Chilean seabass) to avoid for lack of sustainability reasons. Environmental advocacy groups such as the Sierra Club, the National Audubon Society, the Monterey Bay Aquarium, and Environmental Defense prepare these lists, but the criteria for listing are not always clear. The difficulty with seafood is that there are many different fish species available in different locales. As in the case of orange roughy, there have been problems de-listing species after their populations have recovered. The result is that the lists can confuse or misinform consumers.

Eco-labelled Foods

Consumer willingness to pay for eco-labelled foods is unclear.

Sustainability concerns motivate some consumers to look for foods certified as environmentally friendly or sustainable. so-called "eco-labelled" foods. However, it is not clear whether or how much most people are willing to pay for foods certified as eco-labelled. Consumers typically seek highest affordable quality based on household budget and perceptions of product quality. In France, certified growers of fish and poultry can apply the "Label Rouge" to their products, a government trademark label signalling superior quality.

Animal Welfare and Human Health

Many North American and European consumers are interested food in obtained from animals raised and killed in a humane environment or caught in a way that avoids harming non-target fish species. In supermarkets, for example, it is now very difficult to find canned tuna that is not stamped "dolphin-friendly".

Consumers are also concerned about issues such as genetically modified or engineered foods, chemical residues, irradiation, food additives, and hormones. European consumers are less likely than their US counterparts to accept the safety of goods that have been altered using biotechnology.

Marine Stewardship Council and Sustainability

There is an evolving global conservation ethic that is promoting production of food in a sustainable manner.

MSC has developed international sustainability standards and product labelling for seafood.

The most far-reaching sustainability initiative for seafood is the Marine Stewardship Council (MSC), which was launched by the multinational corporation Unilever and the World Wildlife Fund for Nature. To reverse the decline in world fisheries, MSC aims at harnessing consumer purchasing power to generate change and promote environmentally responsible stewardship. The Council has developed a standard for sustainable and well-managed fisheries,with a product label to reward responsible management and practices. Its current mandate is limited to capture fisheries.

Under the MSC process, fisheries undergo a rigorous, independent, third party evaluation against the international standard for sustainable fisheries. Successful fisheries then have the right to use the MSC logo on their products, provided that the custody is verifiably intact. To date, seven fisheries, including Alaska salmon, have achieved certification. Another ten, including Alaska sablefish, pollock, and halibut and BC halibut and salmon, are in the certification phase with many others in pre-assessment. More than 100 shelf-ready products now carry the MSC label.

Certification of Alaska salmon has created expectations for BC salmon.

MSC has become a powerful market incentive. For example, with the certification of Alaska salmon, some customers now expect BC salmon to have MSC certification as well. MSC certification is increasingly demanded at the retail level in both Europe and the US. International acceptance of the process has also spawned competing eco-labels, especially in Europe.

MSC certification, however, conveys nothing about product quality. For example, New Zealand hoki is MSC-certified but Unilever has expressed concern over product quality, specifically bruising in the meat.

There is also a trend for retailers and foodservice to institute sustainable sourcing policies for seafoods and meats e.g., Sainsbury, McDonalds, Ahold, Unilever.

3.3 Trade Issues

World fisheries trade is characterized by a wide variety of products and markets. The most important factors influencing trade flows are distance, consumer preferences, and resource endowments.

International trade in fish products has increased to a record $US 55 billion (FAO 2002). Fisheries trade in the past decade has grown at an average annual rate of 4%.

3.3.1 Trade Agreements

WTO

The WTO seeks a fair trading system for all member countries.

The World Trade Organization (WTO) currently has more than 140 members, including Canada, that together account for 90% of world trade. WTO members are required to grant equal treatment to goods and services from all other members. If a member offers better terms and conditions of trade to a trading partner designated as a Most Favoured Nation (MFN), the same must be done for all other MFNs. Actual applied tariffs tend to be much lower as a result of preferential trade agreements.

WTO membership does not preclude the use of non-tariff barriers.

WTO can rule whether member trade practices are fair. Member countries may raise barriers against other members' products that they consider to be unfairly traded and may impose countervailing measures to counter subsidies and/or anti-dumping measures to counter the selling of products below cost.

Other Trade Agreements

NAFTA and other regional trade agreements have eliminated or reduced tariffs between countries.

Despite the MFN concept, numerous regional trade agreements provide for more preferential terms of trade. Canada has entered into several free trade agreements, most notably with the US and Mexico through the North American Free Trade Agreement (NAFTA). Under NAFTA, the US eliminated all tariffs on Canadian products in 1998 and most tariffs against Mexico were removed by the end of 2003. Canada has preferential tariffs for Commonwealth countries in the Caribbean and for Chile under the Canada-Chile Free Trade Agreement.

The European Union is a trading block of 15 nations with one set of tariffs to cover all countries. Each EU country is able to set non-tariff barriers such as product labelling. The current membership consists of Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden, and the United Kingdom. Another ten nations, mainly in Eastern Europe, are candidates.

A free trade agreement linking Canada, Norway, and Iceland could have major impacts on the seafood industry.

Neither Norway nor Iceland belongs to or is planning to join the EU. Major seafood exporters, both are signatories of the European Free Trade Agreement (EFTA) which also includes Switzerland and Liechtenstein. EFTA has signed a free trade agreement with the EU. Canada and the EFTA are currently negotiating a similar agreement that could have implications for the domestic seafood market.

3.3.2 Tariffs and Non-Tariff Trade Barriers

Tariffs for Seafood

Tariff structures are typically complex and exhibit a wide array of duty levels. Tariff rates are based on the International Harmonised System (HS) that is administered by the World Customs Organisation (WCO). A total of 177 countries use HS as the basis for their tariff system.

	Average Applied Tariff (%)				
HS Code	Canada	US	Japan	China	EU
0301 Fish – live	0.0	0.0	2.2	11.7	6.8
0302 Fish – fresh	0.1	0.8	4.8	17.9	12.9
0303 Fish – frozen	0.1	0.7	4.4	18.5	13.6
0304 Fish – fillets/meat	0.0	0.7	4.4	30.0	10.2
1604 Fish – prepared/preserved	5.4	5.2	9.2	25.0	18.4
0306 Crustaceans	2.7	1.3	3.8	24.0	11.0
0307 Molluscs	0.5	0.4	7.4	21.9	7.2

Canada has essentially opened its domestic seafood market to the world, including low cost competitors, while these same countries continue to maintain high tariffs for imported seafood products.

High tariffs in key markets make Canadian value-added seafood products uncompetitive.

Average tariffs for raw or unprocessed fish tend to be much lower than those for processed products. High tariffs in the EU, Japan, and China encourage Canadian exports of seafood raw material rather than value-added, processed products. That is, the tariffs make Canadian processed seafood products uncompetitive in international markets, especially if the price of raw material ingredients is high. As a result, few value-added seafood products are likely to be made in Canada unless produced primarily for the North American market.

Non-Tariff Barriers

As tariffs fall with trade liberalization, the use of non-tariff barriers is growing.

As free trade agreements are negotiated and world trade increases, tariffs are generally falling. At the same time, countries are resorting to various non-tariff barriers to protect their domestic industries. Some of these barriers are designed to meet legitimate policy goal, while others are used deliberately to distort trade. Non-tariff barriers can be challenged but the process is complex and time-consuming. In any case, they result in higher costs to seafood exporters.

Although the WTO encourages countries to use international standards members still have the right to adopt their own standards as they see fit, especially for health and safety concerns. For example, the United States has a zero tolerance policy for the organism *listeria monocytogenes* ("listeria") in foods that are not intended for further heat treatment, such as smoked salmon, a policy that it does not necessarily apply to domestic producers. Most countries have health and sanitary requirements for fish that increase with the number of processing stages.

Hazard Analysis and Critical Control Point (HACCP) systems are common. HACCP is a widely used and internationally recognized science-based control system for ensuring safe food production. HACCP systems identify and evaluate potential hazards in each step of the food production process and establish stringent actions to reduce them. These systems, when properly applied, focus on preventive measures rather than end product testing.

Non-tariff barriers for seafood products can include technical import regulations such as the requirement for fish to be a certain size, or to be gutted and bled when landed directly. The EU, Japan, and a few other countries require fish to be labelled with origin of catch, generic marketing names, and as wild or aquaculture production. The US is mandating country-of-origin labelling in 2004 (see Section 3.3.4). WTO requires notification of technical import requirements and regulations.

3.3.3 Traceability

In recent years, the outbreaks of BSE and *e. coli*, as well as other food safety issues, have highlighted instances of poor production practices and the need to know more about the source of products, how they are treated and/or modified, and what food safety controls have been applied.

Traceability means being able to track a food product's history from conception to consumption.

In light of this heightened scrutiny, all information regarding a food product's history, "from conception to consumption", should be well documented. Traceability refers to mechanisms for tracking product history. It is intended not only to assure consumers of food safety, but also to provide them with differentiated products according to their needs (e.g. wild or farmed, organic/sustainably produced, complying with religious or other requirements). Traceability is an emerging requirement and key component of international trade.

Traceability in fish and seafood products is more difficult than for livestock or crop production. Generally, its application to seafood products lags behind that for terrestrial products. However, traceability for aquaculture products generally is much better than for capture fishery products. Traceability is easier for those capture fisheries with onboard observers and/or port validation of catch.

The EU is developing and implementing traceability requirements.

The EU has required HACCP-based food processing control systems for fish products since 1996. In addition, it has passed or will pass legislation that will increase requirements for fish traceability and documentation. This includes a *Product Safety Directive* (effective 2003), a *Hygiene of Foodstuffs Directive* (effective 2004), and a *General Principles and Requirements of Food Law* (effective 2005). The EU-wide concerted action project TRACEFISH has the objective of developing a set of traceability standards for both capture and farmed fish that can be applied by any operator in the world.

3.3.4 US Country of Origin and Bioterrorism Legislation

COOL

New US country-of-origin labelling guidelines apply to imported seafood products.

The 2002 US Farm Bill requires detailed country- of-origin labelling for fish and shellfish products. On October 30, 2003, the US Department of Agriculture (USDA) issued proposed country-of-origin labelling (COOL) guidelines for domestic and imported meat, fish, shellfish, peanuts, and produce.

The guidelines allow for labelling of the package or individual item, or for the displaying of signs at the retail point of sale (foodservice is excluded). Both the Farm Bill and the

USDA guidelines require that the origin label identify whether the seafood product is wild or farm-raised.

All fish and shellfish whether chilled, frozen, raw, cooked, breaded, or canned will be subject to regulations unless they are an ingredient in a "processed food item". USDA has proposed to define the term "processed food item" as one having undergone a physical or chemical change causing the character to be different than the original commodity, e.g., a fish stick, or as one derived from a food commodity that is combined with other food commodities or other substantial food components resulting in a retail item marketed differently, e.g., seafood medley or surimi.

Proposed labelling requirements are:

- Products produced exclusively in the US – commodities derived exclusively from fish and shellfish hatched, raised, harvested and processed in the US must bear the "Product of the US" designation;
- Products produced exclusively outside the US – commodities derived exclusively from fish and shellfish hatched, raised, harvested, and processed outside the US must bear the designation "Product of Country X";
- Products entering the US for part of the production process – commodities are classified as to point of processing where "processed" means any process that effects substantial transformation as defined by US Bureau of Customs and Border Protection (USCBP) Rules of Origin, e.g., (1) fish caught in US waters and processed into frozen fillets in Canada would be labelled as "Product of Canada" (alternatively the product could be labelled with other production steps, if the product's identity was maintained along with records to substantiate the claim, as "Product of Canada, Harvested in US"), and (2) fish caught in Canadian waters and processed into surimi in the US would be labelled "Product of US"; and
- Blended products entering the US – blended or mixed retail food items that are prepared from raw material sources having different origins must list alphabetically all the countries of origin of all of the raw material contained therein

US producers and processors themselves find the COOL requirements onerous.

The COOL guidelines are meeting with considerable resistance from US agrifood producers and processor, even those who support the concept of such labelling as a trade barrier. Opponents cite the onerous record-keeping requirements and the prohibitive costs of tracking mixed or co-mingled products. For example, retailers will have to segregate similar products of different origins, such as lobsters from Maine and Nova Scotia.

Canada considers COOL a trade barrier to discourage imports.

The US is promoting its guidelines as a tool to advance consumer knowledge. However, Canada views COOL as a trade barrier designed to increase costs for importers and to foster a perception of foreign products as being less safe or of lesser quality than US products.

US Bioterrorism Act

In response to heightened security policies following the September 11, 2001 terrorist attacks, President Bush signed *The Public Health Security and Bioterrorism Preparedness and Response Act* of 2002 (the Bioterrorism Act) in June 2002. The goal of the Bioterrorism Act is to protect the US food supply against the threat of intentional contamination.

The new Bioterrorism Act requires advance notice of all food shipments into the US.

Two provisions impact the BC seafood industry. The first, Registration of Food Facilities, requires facilities that manufacture, process, pack, or hold food for human or animal consumption in the US to have registered with the US Food and Drug Administration (USFDA) by December 12, 2003. Imported food from an unregistered facility will be held at the border. The second, Prior Notice of Imported Food Shipments, requires importers to give the USFDA advance notice of each shipment of food into the US electronically no more than five days before its arrival and no fewer than:

- two hours before arrival by land via road,
- four hours before arrival by air or land via rail, or
- eight hours before arrival by water.

The notification periods are a substantial improvement over the proposed rule issued in 2003 that would have required importers to give notice by noon the day before the arrival of a shipment of food to the US for all modes of transportation including by land via road. Nevertheless, the new regulations and associated record-keeping will add costs to Canadian exporters.

3.4 *Markets and Economic Outlook*

3.4.1 Economic Outlook

The World Economy

Globally, economic and trade growth have been weak, but are slowly recovering.

The world economy has been generally weak but economic activity is picking up in some countries. However, business and consumer confidence in many regions, including Europe and North America, remain uneasy. The end of the official war in Iraq reduced some uncertainty, but there continue to be concerns about regional security and global terrorism. In this climate, investors are seeking lower-risk havens such as government bonds and gold rather than equities.

Growth in world trade slowed in late 2002, due to the general economic weakness, with some improved growth anticipated for 2003 and 2004. The economies of most countries are operating well below their potential. As the world economy picks up, trade and GDP growth in the majority of OECD countries including Canada and the US, will increase after 2004.

The Canadian Economy

The Canadian economy has been hit by the rising dollar, SARS, and other recent events.

Canada's economy was very strong in late 2002 and early 2003, helped in part by low interest rates. However, the spring and summer of 2003 saw a number of events – including a rise in the Canadian dollar, the emergence of Severe Acute Respiratory Syndrome (SARS), a BSE incident in Alberta, and a major power blackout in Eastern Canada – that worked to temporarily reduce this growth. The Canadian economy is expected to recover and pick up in 2004.

The BC economy has lagged behind most other provinces in recent years. It continues to struggle after a drop in tourism in 2003 and a slowdown in the forestry sector aggravated by the softwood lumber dispute with the US. Housing construction and oil and gas development are areas of expansion for the province.

3.4.2 Interest Rates and Exchange Rates

Interest Rates

Interest rates are expected to remain low, encouraging investment.

Interest rates in North America are at their lowest levels in decades. With the weak US economy, the Federal Reserve Bank has cut its rate to 1.0%, the lowest level in 45 years, to stimulate investment and spending. The current Bank of Canada key lending rate is 2.50%. Lower interest rates make it cheaper for businesses, including the seafood industry to invest in plant and equipment. Prime lending rates are typically one to two percentage points higher than the Bank of Canada rate.

Exchange Rates

Through the 1990s into the early part of this decade, the Canadian dollar declined by almost 30% against the US dollar, primarily as a result of the very strong US economy. In 2002 the dollar was worth on average only $US 0.63. This low value made exports relatively inexpensive and many Canadian companies prospered.

Seafood exporters are vulnerable to the fluctuating Canadian dollar.

In late 2002 and early 2003, as the US economy continued to falter while the Canadian economy held strong, the dollar began rising quickly to its current level fluctuating in the $US 0.75 to $US 0.77 range. Few exporters have had time to reduce their exposure of currency fluctuations or to realign costs. The Canadian dollar is expected to remain relatively strong not only against the US dollar but also against other world currencies. This represents a severe challenge for all Canadian exporters, including the BC seafood industry.

3.4.3 Domestic and Key Export Markets

Canada

While the vast majority of BC seafood is exported, there is potential to expand sales within the province and elsewhere in Canada through import replacement. BC and Canada import substantial amounts of seafood from the US, such as oysters from Washington State and wild troll-caught chinook from Alaska and California.

There are multiple benefits to expanding domestic seafood sales.

The stronger Canadian dollar makes domestic sales more attractive. Selling at home avoids trade barrier issues and reduces currency fluctuation risks. Market proximity means that lower transportation costs. Seafood producers would be able to react more quickly to any changes in market demands or conditions. An increase in domestic sales would have the added benefit of possibly raising the profile of and support for the BC seafood industry.

United States

US economic recovery is expected in 2004.

A sluggish economy and high budget deficit in 2003 weakened the US dollar, which has fallen against the Euro, the Canadian dollar and the Japanese yen. Still, the US dollar is relatively strong and has mainly lost ground on currency gains over the last decade. The US economy has already shown several signs of recovery and is forecast to strengthen substantially in 2004.

The US imports three-quarters of its seafood supply and that import share is increasing. It is currently the largest single market for BC seafood products. The US offers the advantages of proximity, easy access due to NAFTA, and social and cultural similarities. The Canadian Food Inspection Agency (CFIA) works closely with US regulatory authorities and the countries' regulations are compatible. (Nonetheless, the US has not stopped blocking shipments of smoked salmon on the basis of *listeria* concerns.)

Seafood producers face the threat of anti-dumping and countervail action in the US.

Despite the general compatibility, it is clear that the US will take measures to protect domestic industries including seafood by petitioning the US International Trade Commission (USITC). During the past decade, US seafood producers have been successful in pursuing dumping cases against foreign seafood producers (see Case Study 1) The US currently applies anti-dumping measures against fresh and chilled farmed salmon from Norway and Chile and countervailing duty on salmon from Norway.

Asia and Australia

Japan's economic outlook is improving.

Japan is still experiencing economic deflation, with general price levels falling. Consumer confidence has declined, long-term unemployment has become entrenched, and interest rates have been near zero since 1999. The yen has appreciated since early 2002, a fact that continues to depress domestic prices. Government spending, particularly on construction projects, is keeping the economy active, but the country's debt is enormous and growing. The economy remains somewhat weak but business investment is increasing and the economy is expected to improve in 2004 as world trade increases.

Japan is the second largest export market for BC seafood. In Japan, Canadian seafood falls under MFN rates of duty. Consumption taxes and fish import quotas are also in place for Alaska pollock, mackerel, herring, cod, and squid. Imports are subject to tolerances for mercury and PCBs. Domestic catches are declining, however, and Japan is resorting to more imports of seafood.

The economy of **China** is growing at a rate of 7% to 8% annually. The emergence of SARS in late 2002 disrupted the Chinese and Hong Kong economies (e.g., negatively impacting the Hong Kong market for BC geoducks). However, recent economic growth rates are expected to continue for several years.

With its abundant cheap labour, China has become a manufacturing powerhouse producing an enormous variety of industrial and consumer goods for the rest of the world. Currency fluctuations will also benefit Chinese exports. The Chinese yuan (or renminbi) is linked to the US dollar so the dollar's recent decline makes China's exports to Europe and Japan more competitive. (The yuan is not traded in global currency markets.) At the same time, these exports have not lost any competitiveness in US markets.

A fast-growing economy and large population make China a highly favourable seafood market.

China joined the WTO in 2001 and is reducing tariff levels. While tariffs will remain high on some goods, its WTO membership provides greater opportunity for exports to China. A huge population and rising income level have created a middle class of more than 200 million people who are large seafood eaters and have the disposable income to purchase imported seafood.

Hong Kong is now a special administrative region of China but remains a separate member of the WTO. Although currently in a recession, its economy is expected to improve as world trade and economic growth recover.

Case Study 1: US-Vietnam Trade Dispute over Catfish

Issue

Now the country's most successful aquaculture business, the US catfish industry spent years and millions of dollars transforming the image of catfish from "river rats" to a Southern delicacy. However, average producer prices which had peaked at $US 0.75/lb in 2000 declined to $0.57/lb in 2002, while frozen fillet prices fell from $2.83/lb to $2.39/lb over the same period. Many in the industry attributed the price decline to rising imports of frozen fillets of Vietnamese catfish known as "basa" and "tra". After the lifting of trade sanctions against Vietnam in 1994, bilateral trade negotiations had seen the removal of tariffs on Vietnamese catfish in 2000 and the signing of a landmark trade agreement between the US and Vietnam in December 2001.

Response

To counter the wave of Vietnamese imports, the Catfish Farmers of America (CFA) convinced Congress to pass a law in November 2001 that only the species *Ictalurus punctatus* could be accurately labelled as catfish, despite the existence of more than 2,000 species of catfish including the Vietnamese *pangasius*. At the same time, the industry embarked on an aggressive promotional campaign to emphasize the qualities of US catfish over "inferior" Vietnamese products that it maintained were grown in rivers polluted by Agent Orange and other toxic chemicals.

When the labelling law and promotional campaign failed to slow the imports, CFA and other industry groups claimed that the Vietnamese were dumping frozen catfish fillets in US markets at artificially low prices. They filed an antidumping complaint with the US International Trade Commission (USITC) on June 28, 2002. The petitioners alleged that producers in Vietnam, where incomes average about one-fiftieth of American levels, were subsidizing sales to US catfish consumers.

Results

In a preliminary ruling in January 2003, the US Department of Commerce (USDOC) found that Vietnamese catfish had been sold at less than fair value and issued anti-dumping tariffs ranging from 38% to 64%. These tariffs were upheld in the Department's final ruling in June 2003 and in a subsequent decision by the USITC on July 24, 2003.

Vietnamese seafood exporters deny selling fish at below market costs and attribute their advantage to cheaper input costs and superior breeding grounds in the Mekong River. However, the USDOC argued that since Vietnam was a non-market economy, its claims to have low input costs could not be accurately measured against those of a free market economy; instead, investigators used cost information from Bangladesh and India. While cheap and abundant labour alone is sufficient to ensure the competitiveness of Vietnamese fish, the US price declines were likely caused in part by increases in domestic catfish production, in terms of both productivity and dedicated pond acreage.

Catfish prices bottomed out in January 2003 and are expected to rise over the rest of the year. Although US sales of Vietnamese catfish have fallen sharply since the preliminary USDOC ruling, basa seems to have established an identity among some buyers who favour its higher oil content and attractive white colour. Consequently, the value (price) of imported basa is growing in the US. Vietnamese producers are also looking to markets in Australia, China, and Europe.

Lessons Learned

After encouraging Vietnam to adopt free market principles, US industry and lawmakers were unwilling to uphold those principles in the face of losing business and market share to lower cost Vietnamese catfish producers. Republican Senator John McCain, a Vietnam veteran and key figure in the normalization of diplomatic and trade relations with Vietnam, has called the catfish war "a troubling example of the very protectionism we have urged the Vietnamese to abandon". This protectionism is spreading as evidenced by the fact that US shrimp producers have filed similar complaint against Vietnam and several other major shrimp producers.

(On February 17, 2004, the USITC determined that there was indication of dumping of frozen and canned warmwater shrimp and prawns from Brazil, China, Ecuador, India, Thailand, and Vietnam in the US. The USDOC is expected to make a preliminary anti-dumping determination on June 8, 2004.)

The Hong Kong dollar is officially pegged to the US dollar. As a free port, the region generally does not have tariffs on imported goods. The recently signed China-Hong Kong trade pact will eliminate all tariffs on goods, thus opening a "back door" to the Chinese market.

Hong Kong's new cadmium level for BC oysters is a non-tariff barrier.

Hong Kong itself is an important market for BC oysters. However, a recently imposed 2 parts per million (ppm) cadmium level for BC oysters is believed by many to be a deliberate non-tariff barrier.

Taiwan was accepted into the WTO in 2002, and has lowered many tariffs and removed non-tariff barriers. To comply with WTO regulations, it is expanding imports. Nonetheless, changes in import rules and regulations can be made with little warning.

New Zealand and Australia have seen a period of economic growth, but their economies slowed down in 2003 as trade decreased and their currencies, particularly for New Zealand, rose in value. Again, economic recovery is expected in 2004.

Europe

Modest economic growth is also projected for Europe. Consumer demand will likely remain weak in the near term as unemployment persists. The Euro is strong having risen about 35% against the US dollar in recent months. Further currency appreciation could slow prospects for recovery in 2004. The United Kingdom is weathering the current economic downturn better than other European countries, although the pound has weakened since last autumn.

In the European Union, tariffs for specific HS-code products are uniform for member countries, but non-tariff barriers differ across member countries. Value-added taxes (VAT) vary by country and often by product within a country. As a result of EFTA, non-members Iceland and Norway receive preferential tariffs over countries such as Canada. Canadian seafood exports are covered under MFN tariffs and range from 2% to 25%.

The EU applies lower duties to imported raw materials and semi-processed products.

Driven by depleting domestic fish stocks, the EU has gradually opened up to seafood imports particularly those intended for further processing. Dependency on imports for fresh product means lower duty rates on raw material and semi-manufactured goods. On occasion, duties are suspended either temporarily or permanently if EU producers require imported material to manufacture exports. Concerns over dumping resulted in the EU-Norway Salmon Agreement, which includes among other provisions a minimum price for Norwegian salmon.

The UK places a high priority on food safety following the episode of mad cow disease several years ago and major supermarket chains have strict technical requirements. Seafood exports from Canada can enter France according to EU requirements, but live molluscs must come from approved establishments. France's list of approved establishments differs from the EU list.

MSC certification and eco-labelling appear to be very important to European markets. Starting in 2005, some major European buyers will only purchase MSC-certified fish.

The EU has proposed labelling of imported product.

The EU has proposed new labelling requirements for importers that require seafood products to be labelled with the name of the seafood, its origin, and method of production. Under the EU proposal, it would be necessary to indicate the broad geographic area of harvest and specify if the seafood is cultured. Imported seafood will have to be accompanied by documents showing the specified information, even if the seafood is not intended to go on retail shelves.

4.0 BC RESOURCE ASSESSMENT AND ISSUES

A healthy aquatic environment and resource base is important to sustain a viable seafood industry and recreational fishery. This section provides a brief overview of the general health of fish stocks in BC, the impacts of changes in climate and the ocean environment, and the status of and challenges for resource sustainability. Also discussed are: the "precautionary approach", the impacts of the recently enacted federal Species at Risk Act (SARA), and DFO's yet-to-be-released Wild Salmon Policy.

4.1 General Health of Wild Fish Stocks

Exhibit 11 provides an overview of stock assessment status for wild fish in British Columbia with additional details available in Appendix E.

4.1.1 Salmon

Salmon have a particularly complex biology because their anadromous lifecycle includes both freshwater and saltwater (ocean) phases. Five species of salmon spawn in BC waters: sockeye, coho, chinook, pink, and chum.

There are 9,600 distinct salmon spawning runs in BC.

A 1996 American Fisheries Society review identified 9,600 distinct salmon spawning runs in BC (Slaney et al. 1996). The study was able to assess stock status for only about one-half of the runs in BC. Of those assessed, significant concerns were expressed for about 20% of the runs and 142 were found to be extinct.

Variation in Salmon Abundance

The mid-1980s witnessed record landings for many of the commercial salmon fisheries. This was due in part to a period of high ocean productivity, increased production of hatchery fish, and, in some cases, high fishing rates. At the same time, there was considerable growth in recreational fishing effort especially on the West Coast of Vancouver Island and on the Central and North coasts, including the Queen Charlotte Islands, where lodges were developed.

Changing ocean conditions are a major factor in variable salmon abundance.

During the 1990s, some stocks experienced large declines in spawning escapements, notably upper Skeena and upper Fraser coho as well as Rivers and Smith Inlet sockeye. In 1998, DFO banned coho fishing along the entire BC coast to protect weak Skeena River and upper Fraser River coho stocks and for the last several years has closed directed fisheries for Rivers and Smith Inlet sockeye. Changing ocean conditions and poor ocean survival appear to have been key factors in this decline.

A climatic regime shift since 1999 has meant that for many stocks such as coho off the West Coast of Vancouver Island (WCVI) ocean survival rates have improved considerably. Still, specific stocks are considered to be depressed and recovery plans are in place for ones that are critically so. It is too early to conclude that the current favourable ocean conditions will be sustained. However, if these conditions persist and stocks are able to rebuild, the result could be greater commercial and recreational harvest opportunities over the next five to ten years.

Exhibit 11: Overall Health of Wild Fish Stocks in BC

Species	Current Status*	Comments
Salmon		
Chinook	Healthy	Continued improvement from late 1990s; most stocks at or above escapement goals
Coho	Mixed	Continued improvement from late 1990s, particularly in Strait of Georgia; interior Fraser River and some North and Central Coast coho remain weak
Sockeye	Healthy	Increased returns to Nass, Skeena, Barkley Sound and most Fraser River stocks; continued concerns about in-river mortalities in late Fraser River run; Sakinaw Lake, Cultus Lake, Rivers and Smith Inlet stocks depressed
Pink	Healthy	Record returns to Fraser River in 2001; localized concerns for some Central Coast and Broughton Archipelago stocks
Chum	Mixed	Generally stocks in south are strong; some North Coast stocks remain depressed
Herring and Other Pelagics		
Herring	Mixed	Abundance varies regionally
Sardine	Healthy	Distribution and abundance highly influenced by climatic conditions; present in BC waters during warm water conditions
Eulachon	Mixed	Fraser River fishery closed in 1998; listed as "threatened" by COSEWIC; strong recovery of many stocks since 2001 (except Central Coast)
Albacore Tuna	Healthy	Highly migratory species; Canadian catch is small share of total Pacific landings
Groundfish		
Halibut	Healthy	Considered model of international fisheries management
Sablefish	Healthy	Some uncertainty as to current level of recruitment
Pacific Cod	Under Review	Low recruitment during the 1990s; some recent evidence of increased recruitment
Lingcod	Mixed	Stocks vary by area; Strait of Georgia stocks remain depressed
Hake	Under Review	Outside of Strait of Georgia, last survey indicates lowest biomass in past 25 years; some evidence of moderate recruitment since 1999
Inshore Rockfish	Depressed	Conservation concern, particularly in Strait of Georgia, including both commercial bycatch and recreational catch; recent implementation of rockfish conservation areas to protect spawning biomass
Shelf/Slope Rockfish	Mixed	Lack of timely, stock assessment data adds to uncertainly; bocaccio rockfish listed as "threatened" by COSEWIC
Flat fish (Dover, Rock, English sole)	Mixed	Generally low recruitment during 1990s, due to unfavourable ocean conditions
Shellfish and Invertebrates		
Geoducks	Healthy	Need for better biomass and recruitment estimates
Red Urchin	Healthy	Need for improved biological information
Sea Cucumber	Healthy	Lack of biological information for some areas
Abalone	Depressed	Fishery closed; SARA listed species (Threatened)
Dungeness Crab	Healthy	Concerns about oversubscribed fishing effort
Prawns	Healthy	Concerns about oversubscribed fishing effort
Shrimp	Healthy	Concerns about oversubscribed fishing effort
Intertidal Clams	Mixed	Over-harvest of specific beds in Strait of Georgia

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* *Status classified by consultants under three categories – "healthy", "mixed", and "depressed" – with Pacific cod and hake classified as "Under Review" as both will be subject to biomass surveys in 2004 (there is anecdotal evidence of increased biomass in recent years).*

A Change in Salmon Management Approach

Salmon harvest rates are down substantially, with reduced runs and the adoption of a precautionary approach to management.

The amount of salmon available for harvest has decreased in recent years for at least two reasons. First, as mentioned above, in the late 1990s there was a decline in the numbers of salmon returning to BC streams. Second, the adoption of a precautionary approach to salmon management by DFO meant that, where weak and strong salmon stocks intermingle, only selective fishing would be allowed i.e., traditional mixed stock fisheries were curtailed.

Many salmon stocks have rebuilt and may be able to withstand increased fishing pressure.

The result is that salmon exploitation rates that were previously in the range of 60% to 80% are now between 20% and 40% range (see Exhibit 12 on Fraser River sockeye). The recent rebound in salmon stock abundance, together with industry's increased ability to fish stocks selectively, suggests that salmon exploitation rates may be able to be increased.

Fraser River Sockeye

Fraser River sockeye is a very important component of BC commercial and aboriginal salmon fisheries, and a growing part of the recreational fishery. In recent years, Fraser sockeye runs have experienced significant natural in-river mortality on return to spawning grounds, mortality attributable for early run stocks to stress and high river water temperatures, and mortality attributable for late run stocks to the effects of an endemic parasite. In 2002, fisheries managers severely curtailed fishing opportunities in anticipation of continued high in-river mortality, but the expected high mortality did not occur and substantial fishery benefits were foregone.

A DFO review recommended management changes for Fraser River sockeye.

DFO subsequently launched a review of the 2002 management of Fraser River sockeye. The review produced 14 recommendations, including further research on in-river mortality and stock assessment, all of which were accepted by the Department. One recommendation was the development of a new policy advisory process involving First Nations, commercial and recreational fishing sectors, conservation organizations, community groups, and the provincial government.

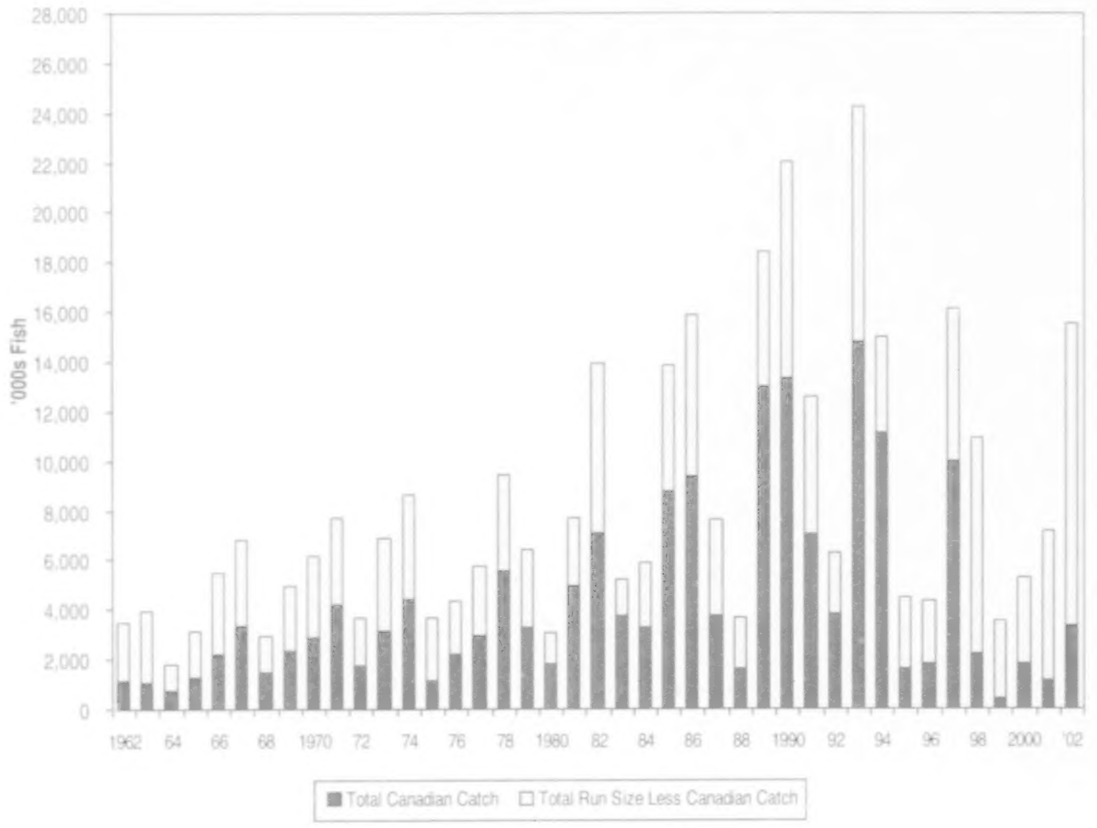
Key Issues and Research Areas

There are a number of key issues and research areas that need to be addressed for Pacific salmon:

- declining government funding for core stock assessment;
- definition of management conservation units;
- determinants of marine survival;
- protection and restoration of salmon habitat;
- role of salmon enhancement in stock rebuilding and augmentation; and
- interaction of wild and farmed salmon.

DFO has launched policy initiatives and research programs in some of these areas.

Exhibit 12: Fraser River Sockeye Run Size and Canadian Catch Estimates



Note: Catch is sum of commercial, recreational, and aboriginal catches.

Source: Pacific Salmon Commission, Pacific Fisheries Resource Conservation Council and GSGislason & Associates Ltd. "The 1999 Fraser River Sockeye Fishery: A Lost Year", prepared for MAFF, October 1999.

4.1.2 Herring and Other Pelagics

Pelagic fish stocks are prone to boom and bust cycles.

Pelagic fish such as herring and sardines tend to be relatively fast growing and short-lived. Many of these species occur in large schools; are important forage for birds, mammals, and larger fish like salmon; and migrate close to shore to spawn. While their schooling behaviour makes them vulnerable to overfishing, many stocks can recover in a relatively short period. Thus, these species often undergo "boom and bust" cycles.

Herring

The herring fishery is sustainable, with some regional ups-and-downs.

Herring has been managed conservatively for more than 20 years. Herring stock status varies by management area, and continued variation in stock status between areas is expected. The historic pattern of herring abundance is one of geographic variation rather than coast-wide cycles of abundance. Therefore, on a coast-wide basis fishing opportunities should be sustained and remain relatively stable, but regional fisheries closures and quota variation are expected. The fishery is fully exploited.

Sardines

Currently, Pacific sardines are one of the few under-utilized fishing opportunities on the coast. In 2002/03, less than 1,000 tonnes of 5,040 tonne quota were taken. Pacific sardines appear to be abundant in BC waters during periods of warm surface water temperature conditions (El Nino). Therefore, long-term, sustained fishing opportunities cannot be expected although some short term fishing opportunities may be available.

Tuna

Albacore tuna represent the only large, predatory pelagic species harvested in BC. Fishing effort has grown substantially over the last decade and the stock appears healthy. However, there is mounting concern about the state of large pelagic fish stocks globally due to expanded fishing effort. Landing only 3% of the Pacific albacore catch, Canada has little control over exploitation rates in international waters where most of the fish are harvested.

4.1.3 Groundfish

With limited resources for stock assessment, stock status is uncertain for many groundfish species.

Groundfish is a complex fishery. A wide array of species and stocks is harvested and many factors influencing life history and population status are not fully understood. Limited resources for stock assessment mean that, for many species, stock status will remain uncertain. This problem is being addressed through the fisheries observer program, which since 1996 has produced a comprehensive catch and biological (length, sex, age) dataset for the full groundfish trawl fleet. Nonetheless, resources for timely data analysis continue to be an issue.

Most Species are Fully Exploited

The known stock status of groundfish species varies from healthy (halibut) through mixed (many species) to depressed (petrale sole, Pacific cod, inshore rockfish). Almost all species are considered to be either fully exploited or overexploited. Bocaccio, a shelf rockfish species, has recently been listed as "Threatened" by COSEWIC (see Section 4.6.2).

Substantial Progress in Sustainability

Management practices for the halibut, sablefish, and groundfish trawl fisheries are internationally recognized.

Various fisheries have made substantive progress towards sustainable fishing practices and effective co-management processes over the past ten years. Halibut, sablefish, and the groundfish trawl fisheries are notable examples. These fisheries are gaining global recognition for their management initiatives.

A decade of extremely low recruitment has led to the introduction of conservative quotas for many groundfish species. The low recruitment is usually attributed to unfavourable ocean conditions, but the actual causes are unknown. Since many species take five to ten years to "recruit" to the fishery, conservative quotas are anticipated over the short term. As more is learned about the effects of climate on fisheries and other risk factors, it may be possible to manage these fisheries more sustainably in the future.

Environmental Concerns Remain

Information on total catch – harvest plus discards – is important for stock assessment purposes.

Recovery planning for inshore rockfish and bocaccio will impact management of virtually all groundfish fisheries. Seabird bycatch concerns in groundfish hook and line fisheries (halibut, rockfish and sablefish) can likely be mitigated by using new technology and better fishing gear. There is growing environmental concern about destructive fishing methods and levels of discard, particularly in trawl fisheries. The BC fleet has been progressive in this area, moving towards fuller utilization (e.g., turbot). All discards are accounted for and incorporated into stock assessment processes. In addition, particularly sensitive areas (i.e., sponge reefs, inshore rockfish habitat) have seen voluntary and mandatory fishing closures.

Nevertheless, concerns persist about catches of species that are not under quota management such as rex sole and some rockfish species. The groundfish industry, DFO, and MAFF are working towards integrated management of groundfish, which should provide for improved bycatch and non-quota species management.

4.1.4 Shellfish and Invertebrates

Dive Fisheries

Conservative management, using individual quotas, is key for dive fisheries.

The shellfish dive fisheries (geoduck, sea urchins, and sea cucumbers) started in the 1970s. The potential for overharvest by dive fisheries was demonstrated as they expanded rapidly through the early 1980s. By 1990, the abalone fishery had collapsed and it remains closed today. Geoduck landings peaked in 1987 at three times their current harvest levels.

In the 1990s, the dive fisheries moved to a more conservative management regime, including individual quota management. Given the potential for overharvesting using diving methods, conservative management and reliable biological data are essential in these fisheries.

Trap Fisheries

Crustacean fisheries (Dungeness crab and prawn) appear to have sustained themselves reasonably well without a quota system. However, effort limitation and compliance are important management issues in these non-quota managed fisheries. Reliable catch data for the recreational fishery is a key issue in managing the prawn and Dungeness crab fisheries.

PSP Testing

The lack of PSP testing on the North and Central coasts is a constraint on shellfish fisheries.

Harvests of bivalve shellfish require Paralytic Shellfish Poison (PSP) testing for "red tide". Intertidal clams (littleneck, manila, and butter clams) on the North and Central coasts represent one of the few expansion opportunities for species currently fished commercially. However, the lack of PSP laboratory facilities in the North coast constrains development. The lack of access to PSP testing is also a constraint to shellfish culture in the North.

4.2 New and Emerging Fisheries

In 1995, the federal and provincial governments signed a MOU on new fisheries development. In 1999, DFO designated a phased assessment approach that was initially developed for new invertebrate fisheries. There are three development phases:

- **Phase 0 Initial Assessment** – a review of existing information on the biology, management, and ecological interactions for the species of interest in BC as well as a review of similar fisheries in areas outside the province;
- **Phase 1 Experimental Stage** – a limited experimental fishery designed to address data gaps identified in the initial assessment, including abundance (biomass), distribution and appropriate harvest technologies; and
- **Phase 2 Exploratory Stage** – a larger experimental fishing stage, using a precautionary approach, generating fisheries management data and limited to existing licence holders.

DFO is currently developing a National Policy on New and Emerging Fisheries which will include clarification of how a fishery goes from Phase 2 to full-scale implementation.

The experience to date in BC suggests that the information requirements for Phase 0 and Phase 1 assessments can be lengthy and cost-prohibitive to fulfil, thereby inhibiting the fisheries development process.

Some crab and other invertebrates could support small sustainable fisheries.

The current status of emerging fisheries is summarized in Exhibit 13. Most new and emerging fisheries opportunities rest with invertebrates such as Tanner crab and varnish clams. Although these opportunities appear modest in terms of catch volume, some (e.g., Tanner crab) could support small but lucrative fisheries.

4.3 The Ocean Environment and Climate Change

Recent evidence indicates that ocean productivity is highly influenced by climatic conditions. Three of the most important factors are: 1) El Nino and La Nina effects, 2) decadal scale cycles, and 3) climate change. Understanding of these climatic influences is developing rapidly and will be key to sustainable fisheries management.

4.3.1 El Nino and La Nina

El Nino events are generally associated with warm climatic conditions in the eastern North Pacific and North America. La Nina events are characterized by cooler conditions. The frequency and intensity of El Nino events were unprecedented in the 1990s. La Nina conditions have generally persisted since 1999, with a rather modest El Nino in 2002.

Exhibit 13: Status of Emerging Fisheries by Species in the Pacific Region*

Species	Fishing Gear Type	Status/Comments
Box Crab *(Lopholithodes forminatus)*	Trap	Initial Assessment completed. The cost of determining biomass is considered prohibitive, not generally an economically viable fishery in other areas (i.e., Oregon).
Purple Sea Urchin *(Stongylocentrotus purpuratus)*	Hand harvest	Intertidal species in high energy environments. Initial assessment completed, no experimental fishing activity planned due to concern about harvesting in abalone habitat.
Tanner crab *(Chionoecetes tanneri and C. angulatus)*	Trap	Deeper water crab species, prefers mud bottoms. Phase 1 experimental fisheries underway since 2000, experimental program expected to continue until 2005.
Gooseneck Barnacles	Hand Harvest	Intertidal species in high energy environments. Reliable bioestimates not possible or cost prohibitive due to patchy distribution. Limited experimental fisheries planned in part due to disturbance of high energy intertidal communities. Some work is underway with Nuu-chah-Nulth Tribal Council (funded by the Province).
Pacific Venus Clam *(Compsomyax subdiaphana)*	Subtidal Harvest Methods (Dive/Mechanical)	Subtidal clam species in sand substrates. Phase 0 assessment completed, no further experimental fishing planned due to habitat impact concerns with mechanical harvest.
Sea Mussel *(Mytilus californianus)*	Hand	Intertidal species in high energy environments. Initial Assessment complete, recommendation not to proceed due to disturbance of high energy intertidal communities.
Varnish (Savoury) Clam *(Nuttallia obscurata)*	Hand dig	Recently introduced intertidal species found in habitat similar to Manila clams. Clam lease holders can now harvest and sell to a limited market, intertidal clam licence holders will be given the opportunity to harvest if market demand exists.
Oceanic Squid Species	Hook and line jig	Primarily Neon Flying squid (*Ommastrephes bartrami*), found offshore warm surface waters. Has yet to be proven an economically viable fishery in Canadian waters, no current interest in fishing opportunities.
Pacific Sardine	Purse seine	Pelagic schooling fish found off west coast of Vancouver Island under favourable ocean conditions. Integrated commercial fishing plan completed, with 5,000T allocation to a commercial fishery and additional quota to experimental fisheries.

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* *In addition, two dive fisheries (pink/spiny scallop and octopus) previously operating under commercial licences have been converted to scientific permit fisheries. The fisheries are operated on an experimental basis with specific research goals and objectives. The scientific permits are limited to previous commercial licence holders.*

Source: www.pac.dfo-mpo.gc.ca/ops/fm/toppages/newspecies.htm.

El Nino/La Nina events affect the distribution of fisheries resources.

The primary impact of El Nino/La Nina on fisheries resources relates to distribution (north/south, onshore/offshore) rather than to abundance or overall biomass. For example, during strong El Nino events in the 1980s, mackerel moved farther north to Barkley Sound while offshore pelagic species such as albacore tuna and sunfish (*Mola mola*) were observed closer to coastal areas. As voracious salmon predators, mackerel caused very high mortality for juvenile salmon and herring from southern BC stocks during the last two extreme El Nino events of 1982/83 and 1997/98.

The distribution of both hake and sardine in Canadian waters is influenced by El Nino/La Nina cycles. Smaller proportions of the biomass are found in Canadian waters under La Nina conditions.

4.3.2 Decadal Scale Cycles

Ocean productivity changes with decadal scale climate regime shifts.

Increasingly, decadal scale variability in climate conditions is recognized as triggering shifts in marine productivity. This has an impact on successful juvenile rearing for many marine species, including salmon. Decadal scale variability is measured by a number of indices, including the Pacific Interdecadal Oscillation index (PDO), a measure of sea surface pressure and temperature.

Significant regime shifts in the eastern North Pacific appear to have occurred in 1977, 1989 and 1998. From 1989 to 1998, warm surface waters and poor upwelling resulted in low ocean productivity. There is now strong evidence of a general regime shift since 1998 to cooler surface waters and stronger upwelling, resulting in increased ocean productivity. Improved ocean survival since 2000 for most salmon species suggests that the current climatic regime will have a positive impact on salmon stocks in upcoming years.

The impact of today's cooler climatic conditions varies across species.

However, different species and stocks may respond differently to these regime shifts. Shrimp appear to respond positively to the current cooler climatic conditions but less is known about the impacts on Dungeness crab, prawns, and other invertebrates. Although herring do not seem to be as directly influenced by climatic cycles as other species, the association varies regionally. On the West Coast of Vancouver Island, good herring recruitment is generally associated with cooler conditions, while the pattern is opposite in the Strait of Georgia.

With the persistence of the current climate regime, recruitment is expected to improve for many groundfish species including Pacific cod, sablefish, various flatfish, and rockfish. However, as many species recruit to the fishery after 5-10 years, it is too early to assess whether this is actually happening. The impact of variation in ocean climate on fisheries resources is a rapidly developing field and further understanding of these influences will be one of the key factors affecting our ability to manage fisheries in a sustainable manner.

4.3.3 Climate Change

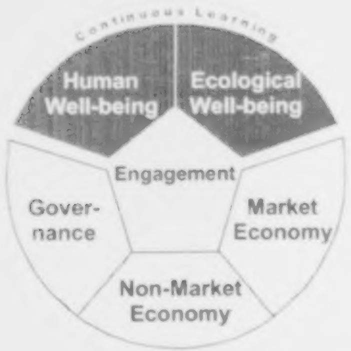
Climate change includes a variety of factors that operate on longer-term cycles than El Nino/La Nina events or decadal scale cycles. The influence of these trends on fisheries resources is less evident than for the shorter-term cycles outlined above.

Climate change may affect spawning success and aggravate El Ninos/La Ninas and decadal cycles.

A current concern on the Pacific Coast is increased summer temperatures in spawning rivers. This is particularly the case for Fraser River sockeye salmon, since spawning success is reduced by water temperatures that exceed 18°C. In addition, climate change may contribute to increased variability or amplitude of change in El Nino/La Nina events or decadal cycling in ways that are, at present, poorly understood.

4.4 Sustainability in the BC Seafood Sector

Many jurisdictions have recognized that the majority of wild fish stocks are either fully exploited or overexploited by commercial fishing fleets. As a result, initiatives have been introduced at the global, national, and regional levels to develop responsible, sustainable fishing practices.



Source: International Institute for Sustainable Development 2002

This section describes some of the key principles underlying sustainability and efforts to support it in BC. The discussion draws heavily on a paper prepared for the BC Seafood Alliance entitled *Progress Towards Environmental Sustainability in British Columbia's Seafood Sector* (Archipelago Marine Research Ltd. 2001).

4.4.1 Sustainability Defined

A Sustainability Model

Sustainability encompasses both environmental and economic objectives.

A general model of sustainability combines human and ecological well-being as its desired outcomes (see graphic). Governance (i.e., management), market economics, and non-market factors (e.g., NGOs, communities) are identified as the means to achieve the desired outcomes.

Engagement by all stakeholders links the means to the desired outcomes, and the entire model is framed in a network of continuous learning (i.e., adaptive management). The BC roe herring fishery is one example of a fishery that operates within this model and is sustainable both environmentally and economically (see Case Study 2).

Case Study 2: Managing for Sustainability – The BC Roe Herring Fishery

Issue

Dating from the early 20th century, BC's commercial herring fisheries were geared for reduction into animal feed and fertilizer. Conservation concerns caused this reduction fishery to close in the late 1960s, but the stock quickly rebounded and a small group of vessel owners launched a pilot herring for roe fishery under a DFO experimental licence, in 1971. The roe herring fishery expanded rapidly to meet the needs of the Japanese delicacy market motivating DFO to impose limited entry of licences in 1977 with 252 seine and 1,327 gillnet licences coastwide. Catches for this fishery were less than half those under the former reduction fishery.

The roe herring fishery of the 1970s developed several important features:

- fishery openings in February to April when test fishing showed the roe content was maximized;
- a predictable annual cycle of science, consultation, and reporting activities;
- the separation of herring science, and management functions within DFO, with science residing with the Pacific Biological Station (PBS) and management with the Fisheries Management Branch; and
- a meaningful, formal consultation process between DFO and industry, and the launch of the Herring Industry Advisory Board.

Herring fishery management continued to evolve in the 1980s. Area licensing was introduced for three areas in 1983 and another two in 1985. These five areas are Prince Rupert, the Queen Charlotte Islands, Central Coast, Strait of Georgia, and the West Coast of Vancouver Island. Starting in 1983, a total allowable catch was set for each area based on a conservative 20% harvest rate of each spawning population. Nevertheless, by the mid-1990s, the fleet was becoming unmanageable and plagued by an inability to meet the total allowable catch. Overages in the seine fleet were common.

Response

In 1996, a pilot pool fishery was implemented for seine vessels. By 1999, pools had become mandatory for all seine and gillnet vessels, with a minimum of 8 seine licences per pool and 4 gillnet licences per pool. Each pool licence received the same quota, and the pool decided how many boats were needed to fish the aggregate pool quota.

Results

The pool fishery has led to a significant reduction in the fleet size, much better adherence to the TAC, decreased costs, and improved product quality. Industry pays for mandatory 100% dockside catch monitoring and, since 1996, has funded herring science initiatives (e.g., stock assessment, juvenile herring surveys) through an allocation of the TAC to the industry-run Herring Resource Conservation Society (HRCS). The HCRS also manages the test fishery under a joint project agreement with the Department. Today, about 100 seine vessels and 300 gillnet vessels/punts fish, representing an 80% decline in fleet size from the late 1970s. The fishery is profitable to commercial fishing licence holders and processors.

Lessons Learned

The BC roe herring fishery is a success story of a fishery that is sustainable and meets the needs of industry and the market. Both DFO and industry have been willing to change and innovate, and have demonstrated leadership and trust. Co-management has been fostered. In the first of a series of report cards on BC fisheries, the Sierra Club of Canada's BC Chapter awarded the Strait of Georgia roe herring fishery a "B", deeming it well managed and a sustainable fishery overall.

International and National Initiatives

The Food and Agricultural Organization (FAO) has led sustainability initiatives at the global level, producing a code of conduct for responsible fishing (FAO 1995), technical guidelines for responsible fishing (FAO 1996, 1999), and guidelines for responsible aquaculture (1997). Canada has responded to international initiatives by producing a Code of Conduct for Responsible Fishing (DFO 1998), which has been ratified by almost all fishing industry associations in BC.

In addition, industry and non-profit partnerships have initiated a number of certification processes, generally known as "eco-labelling". These initiatives are designed to support sustainable fishing practices through the use of market forces and consumer purchasing power (Marine Stewardship Council 1998, 2001).

Harvest rates and methods, as well as management systems, must support sustainability.

The above documents define and address criteria for assessing sustainable fishing practices. They contain three common principles:

1. **Sustainable harvest of target species and stocks** – Harvest rates and techniques should aid in the maintenance or recovery of a stock's health so that present and future generations can benefit from the resource.
2. **Limiting impacts of the fishery on non-target species, habitats, and ecosystems** – Harvests should use techniques to minimize the amount of unintended bycatch and impacts on the ecosystem and habitat.
3. **An effective fisheries management system** – A solid management system, emphasizing scientific principles, credible and reliable data gathering systems, co-management principles and transparency, monitoring and surveillance, and adherence to national and international law, is essential to ensure that the first two principles are observed.

4.4.2 Progress and Challenges to Sustainability in BC

Substantial Progress

BC has made notable progress in a number of sustainability areas.

There has been substantial progress towards sustainability in BC with respect to the three principles above. Initiatives include (see Exhibit 14):

- better biomass and stock assessments (e.g., sablefish, sea cucumber) and conservative harvest rate management (herring, salmon);
- dockside monitoring of commercial catches (e.g., geoduck) and at sea observer coverage on vessels to monitor both retained and discarded catch (100% observer coverage in the groundfish trawl fleet);
- adoption of selective fishing techniques to reduce bycatch (e.g., restricting the salmon gillnet fleet to daytime fishing to reduce bycatch of coho) and adoption of Individual Quotas (IQ) and pool fishery management that have reduced overages to the total allowable catch (e.g., halibut, herring);
- development of environmental codes of practice in the salmon and shellfish aquaculture sectors; and
- effective co-management and international agreements.

Exhibit 14: Examples of Progress Towards Sustainability in BC

Principle #1: Sustainable Harvest of Target Species and Stocks

1.1 Informed Stock Assessment

  - sablefish tagging and groundfish biological sampling
  - annual biomass surveys for dive fisheries – geoducks, urchins, sea cucumbers

1.2 Limiting and Measuring the Catch of Target Species

  - conservative quotas and harvest rate management, e.g., 1% for geoduck, 2% for red sea urchins, 20% for herring (subject to a threshold)
  - third party dockside monitoring programs (DMP) of IQ and pool fisheries, e.g., groundfish trawl, halibut, sablefish, herring
  - input controls, e.g., crab trap limits (subject to electronic monitoring in Queen Charlotte Islands)

Principle #2: Limiting Impacts on Non-Target Species and on Habitats and Ecosystems

2.1 Moving from Landings to Catch Data

  - 100% observer coverage on groundfish trawl (retained and discards)
  - sample observer coverage: halibut, sablefish, rockfish (ZN), salmon

2.2 Addressing Administrative Barriers

  - transferability of rockfish bycatch holdings for halibut fleet
  - increasing the number of quota species (including turbot) in the groundfish trawl fishery
  - movement toward integrated groundfish management in the trawl, rockfish (ZN), and halibut fisheries

2.3 Adopting Selective Fishing Techniques

  - exclusion grates / excluder nets on shrimp trawlers (to reduce eulachon bycatch)
  - gillnet revival tanks and seine brail systems in salmon
  - barbless hooks in the recreational fishery and commercial troll fishery
  - use of seaboard avoidance devices, e.g., tori lines
  - "red" (no fishing) and "yellow" (selective fishing) zones for coho in 1998

2.4 Minimizing Impacts on the Ocean Bottom

  - avoidance of glass reefs by shrimp trawlers

2.5 Sustainable Aquaculture Practices

  - acceptance by the Province of 49 recommendations in the Salmon Aquaculture Review (SAR) Report
  - codes of practice for salmon farming and shellfish aquaculture
  - measures adopted by the Province and industry include:
    - re-siting of problematic fish farms
    - reduced farm losses (escapes)
    - performance-based management of waste discharges
    - fish health database, fish health management plans
  - vastly improved feed conversion rates on salmon farms

Principle #3: Ensuring Effective Management and Regulations

3.1 Effective Co-management and Individual Responsibility

  - Cohesive industry associations embraced co-management, e.g., halibut, sablefish, geoduck
  - IQ management has reduced overages to TAC

3.2 Negotiating International Agreements

  - International Pacific Halibut Commission (since 1923)
  - Pacific Salmon Treaty (renewed in 1999)
  - Pacific Whiting / Hake Treaty (signed in November 2003)

Source: Archipelago Marine Research, "Progress Towards Environmental Sustainability in BC's Seafood Sector", Prepared for the BC Seafood Alliance, May 2001.

Remaining Challenges

Significant challenges remain for sustainability in fisheries and aquaculture.

A number of challenges and issues surrounding sustainability in the seafood sector have recently emerged:

- weak stock salmon fisheries management and the implications of SARA for both wild fisheries and aquaculture operations;
- lack of comprehensive, verifiable catch – retained and discards – from certain fisheries (e.g., salmon and groundfish longline);
- possible interaction with and impact of marine farmed salmon netpen operations on fish stocks and marine habitat;
- development of an effective co-management structure in the salmon fisheries
- evolution of an effective integrated fisheries management regime for the groundfish fisheries (ZN, halibut, sablefish, and trawl)
- need for a transparent, harmonized regulatory regime for aquaculture; and
- acknowledgement of the need to address uncertainty and risk through precautionary and adaptive management (see Section 4.5).

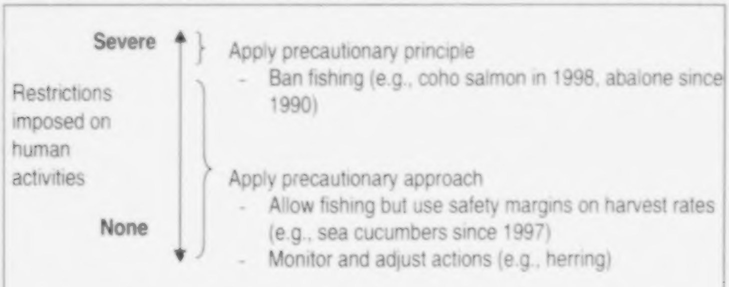
The concept of sustainability is a moving target, with increasing expectations and more stringent standards over time. The "burden of proof" is shifting to industry to demonstrate and support sustainable fishing practices for consumers and the public. To be financially sustainable in the long term, the BC seafood industry (capture and aquaculture) must also be environmentally sustainable.

4.5 Precautionary Approaches to Fisheries Management

Most fisheries management regimes are data-limited. Often, not enough is known to enable sustainable fisheries management at a sufficiently productive level for maintaining economically viable industries and communities. Data are limited for: estimates of stock size; life history parameters such as age of sexual maturity, rates of recruitment, and natural mortality; landings and catch composition; and catch per unit effort and other dynamics of the fishing process.

The Precautionary Approach

In addition, despite efforts to address these limitations, considerable uncertainty always persists in resource management. This uncertainty includes factors over which there can be little human influence such as the impact of decadal regime shifts (Section 4.3.2) on fish populations. The general term "precautionary" is used to describe current approaches to addressing data limitations and uncertainty in fisheries management.


Severe
Restrictions imposed on human activities
None
Apply precautionary principle
- Ban fishing (e.g., coho salmon in 1998, abalone since 1990)
Apply precautionary approach
- Allow fishing but use safety margins on harvest rates (e.g., sea cucumbers since 1997)
- Monitor and adjust actions (e.g., herring)

Source: Dr. Randall Peterman, Simon Fraser University, personal communication, June 2003

The precautionary approach is a risk management tool.

The precautionary approach involves application of prudent foresight to account for uncertainty and incomplete knowledge, in order to reduce risk to an acceptable level. It is a tool for managing uncertainty and risk. FAO guidelines for application of the precautionary approach recognize this risk management focus (*Precautionary Approach to Capture Fisheries and Species Introductions*. FAO 1996, p. 7, emphasis added):

1. *All fishing activities have environmental impacts and it is not appropriate to assume that these impacts are negligible.*
2. *The precautionary approach may require cessation of fishing activities which have potentially serious effects but* ***it does not imply that no fishing can take place until potential impacts have been assessed and found to be negligible.***
3. The precautionary approach requires that all fishing activities are subject to prior review, and active management including defined objectives, assessment, and monitoring.
4. ***The standard of proof used in decisions should be commensurate with the potential risk to the resource, while also taking into account the expected benefit of the activities.***

The precautionary approach and precautionary principle are often confused by the public and fisheries managers.

The precautionary approach combines consideration of uncertainty (the incompleteness of knowledge) with consideration of risk of occurrence (the severity, duration and reversibility of the risk as well as associated probability). Frequently, the general public and resource managers do not distinguish between the precautionary approach and its extreme application – the precautionary principle. Under the precautionary principle, risk assessment suggests that serious or irreversible damage may occur, even though there may be considerable uncertainty due to incomplete knowledge.

Challenges to Implementing the Precautionary Approach

Due to the data deficiencies in most fisheries, the precautionary approach is an essential tool for sustainable fisheries management. On the other hand, considerable challenges remain for its effective implementation, including:

- Misunderstanding and misapplication of the precautionary approach and precautionary principle by the public and resource managers.
- While many fisheries management plans now include catch targets and limit references, there is an overall lack of operational guidelines for applying the precautionary approach in BC's fisheries and aquaculture sectors.

Operational guidelines are needed for applying the precautionary approach to BC fisheries and aquaculture.

BC Sea Cucumber: An Example of the Precautionary Approach

In 1997 the sea cucumber harvest total allowable catch was reduced to a more conservative level, as little was known of its biology or abundance. Commercial harvesting was also restricted to 25% of the BC coast. Surveys done since 1997 have demonstrated actual sea cucumber density to be three to four times higher than originally estimated. As a result of better stock assessment data, the TAC has increased by 80% from 1997 levels.

4.6 Federal Policies and Legislation

4.6.1 New Directions for the Salmon Fishery

The New Direction policy makes conservation the key objective for managing Pacific salmon fisheries.

In 1998 DFO released *A New Direction for Canada's Pacific Salmon Fisheries* outlining the broad policy direction for a new approach to salmon fisheries management (DFO 1998). The New Direction document contains 13 supporting principles under three key components: conservation, sustainable use and improved decision-making. In particular, conservation is the primary objective that will take precedence in managing the resource, and a precautionary approach to fisheries management will be adopted. All sectors – First Nations, recreational, and commercial – will use selective methods to harvest salmon in the future.

4.6.2 Species at Risk Act

COSEWIC

COSEWIC designates the status of wildlife species at risk.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is a group of scientists with representation from federal, provincial, territorial, and independent agencies. It has been assessing the status of species at risk and providing status designations (e.g., Endangered, Threatened) since 1978. In 1999 COSEWIC adopted updated status designation criteria based on criteria developed by the International Union for the Conservation of Nature.

Aquatic Species in BC Designated by COSEWIC as Endangered or Threatened

Endangered	Interior Fraser Coho
	Cultus Lake Sockeye
	Sakinaw Lake Sockeye
	North Pacific Right Whale (recovery strategy underway)
	Blue Whale
	Sei Whale
	Salish Sucker
	Speckled Dace
Threatened	Bocaccio (a rockfish species)
	Humpback Whale

SARA and Its Impact

The federal Species at Risk Act (SARA) aims to prevent wildlife species from becoming extinct, provides for the recovery of species that are at risk as a result of human activity, and helps to prevent species of concern from becoming endangered or threatened. The act covers all wildlife species at risk nationally and their critical habitats, and applies to all federal lands in Canada as well as all aquatic habitats and migratory bird habitat. Complementary provincial and territorial initiatives are facilitated through the Federal-Provincial/Territorial Accord for the Protection of Species at Risk (1996). Under SARA, the Minister of Fisheries and Oceans is responsible for aquatic species.

The process for listing species under SARA involves a political (federal Cabinet) decision.

SARA came into force in June 2003, with sections related to protection and enforcement taking effect in June 2004. Under SARA, COSEWIC was established as an independent body of experts responsible for assessing and identifying species at risk. The 233 species designated by COSEWIC as extirpated, endangered, threatened, or of special concern as of December 2002 became the initial List of Wildlife Species at Risk under SARA. Steps to add species to this list are outlined below:

1. **Assessment and Status Designation** – COSEWIC assesses species status and makes a designation consisting of, in decreasing order of concern, Extirpated, Endangered, Threatened, or Special Concern.
2. **Listing under SARA** – Species with a COSEWIC status are automatically considered for listing under SARA. The Minister of Environment is required to forward the COSEWIC assessment within 90 days to the Governor in Council or Cabinet for a decision. If the Cabinet does not make a decision within nine months, the species is automatically added to the legal list as recommended by COSEWIC.
3. **Endangered or Threatened Species** – For those species legally listed, there is an automatic prohibition on harming individuals or their residences in areas of federal jurisdiction (including the ocean), and mandatory development of recovery strategies and action plans.
4. **Special Concern Species** – Management plans must be developed for these species.

There is also a provision for emergency-listing of a species as Endangered if the species is deemed to be in imminent danger of extirpation.

Recovery plans are required for endangered or threatened species.

Protection (prohibition) and recovery planning is legally mandated for species listed as Endangered or Threatened. SARA mandates timelines for this process, provides for stakeholder involvement and public comment, and requires socio-economic analysis within the recovery action plan. (More information on SARA can be found at *www.sararegistry.gc.ca.)*

Mixed stock fisheries could be severely affected by SARA listing of endangered salmon stocks.

Three BC salmon stocks have been designated as Endangered by COSEWIC (Sakinaw Lake sockeye, Cultus Lake sockeye, Interior Fraser coho). These stocks have yet to be added to the List of Species at Risk under SARA. However, if they are listed, recovery planning for them could severely impact mixed stock salmon fisheries. Alternatively, fisheries including terminal fisheries that employ selective fishing techniques may be affected minimally.

DFO has indicated that it has established teams to develop recovery strategies for all three salmon populations that may be legally listed. These teams will solicit stakeholder and public input.

In addition, fisheries that non-selectively capture a variety of species (i.e., trawl and longline fisheries) would be impacted by listing of COSEWIC designated species such as bocaccio. Mitigation technologies and monitoring could prove to be effective means of reducing bycatch of seabird, mammal, and turtle species that may eventually be listed under SARA.

BC Aquatic Species Listed as Endangered or Threatened under SARA

Endangered	Killer Whales – southern resident group
	Pacific Leatherback Turtle (recovery strategy and action plan underway)
	Several Freshwater Stickleback species (recovery strategy underway)
	Nooksack Dace
	Morrison Creek Lamprey
Threatened	Sea Otter (recovery strategy underway)
	Northern Abalone (recovery strategy completed, action plan underway)
	Killer Whales – northern resident group, transient group
	Several freshwater sculpin species (shorthead and Cultus pygmy)
	Cowichan Lake lamprey

Note: Olympia (native) oysters, offshore killer whale population, and Mottled Sculpins are species of "Special Concern" that do not require protection or recovery plans.

If Fraser River Basin salmon stocks like Cultus Lake are SARA-listed, it is unclear how DFO will address its obligations to protect them in 2004. (Such protection could involve one or more of fisheries management changes/closures, habitat restoration, environmental controls, and enhancement). What is clear is that, if fisheries management bears the brunt of recovery planning, SARA listing could have a severe negative impact.

Definition of a Species

SARA defines a wildlife species to include a species, subspecies, or genetically distinct population (i.e., a stock). This definition provides a broader context than the generally accepted biological definition of species as the category or rank immediately below genus or sub-genus. Under SARA:

> *"Wildlife species" means a species, subspecies, variety or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and*
>
> *(a) is native to Canada; or*
>
> *(b) has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.*

SARA's impact will depend on how the term "species" is applied

The impact of SARA on BC seafood and recreational fishing operations will depend in large part on how the term "wildlife species" is defined operationally.

4.6.3 Wild Salmon Policy

In March 2000, Fisheries and Oceans Canada released a draft Wild Salmon Policy Discussion Paper, part of a series of New Direction initiatives (DFO 2000). The Wild Salmon Policy (WSP) provides an explicit framework for conserving the genetic diversity of wild Pacific salmon and for protecting their habitat. Its primary goal is to ensure the long-term viability of salmon populations in their natural surroundings and the maintenance of habitat for all life stages.

The Wild Salmon Policy will aim to avoid conservation crises.

The draft discussion paper was the subject of extensive consultations, the results of which have since guided the development of a revised policy. Work is underway on operational guidelines for fisheries management, habitat, enhancement, and fish culture, as well as a decision framework that links these guidelines to policy principles. One of the WSP objectives is to avoid the listing of species under SARA by facilitating action in advance of a conservation crisis.

Part C. Seafood Business Assessment

5.0 BC FISH HARVESTING INDUSTRY

The BC fish harvesting sector produces a variety of protein raw material for conversion to finished food products that are distributed throughout the world. The harvesting sector is diverse in terms of species harvested, gear employed, vessel size, and scale of operation.

Exhibit A.1 in Appendix A provides an overview of different fleet components and their recent trends in landings and landed value as well as a "snapshot" of fleet activity and employment in 2002.

5.1 Markets

The capture fishery produced $364 million in landed value in 2002.

In 2002, the BC wild fishery produced 194,300 tonnes of fish and shellfish, consisting of 33,200 tonnes of salmon, 25,200 tonnes of herring, 117,300 tonnes of groundfish, and 18,600 tonnes of shellfish. The 2002 landed value for wild fish totalled $364 million, composed of $57 million of salmon, $47 million of herring, $153 million of groundfish, and $107 million of shellfish.

5.1.1 Domestic and Export Markets

Landed values for wild fish and shellfish are largely based on netback prices. A netback price is the market price paid by the end consumer less the costs and margins of intermediate marketers, distributors, transporters, and processors. Landed prices to fishermen are determined largely by the same factors that affect wholesale prices received by processors. Depending on fishermen-processor relationships, there may be elements of price negotiation.

Buyers

Most of the harvest is sold to BC processors.

The bulk of fishermen sell their catch to BC buyers, who process and sell a wide variety of live, fresh, frozen, canned, smoked, roe, and other products. A small share of the catch in some fisheries, such as halibut and groundfish, is sold to buyers in Washington State and Oregon.

As well, a few fishermen are selling directly to retail, food service (restaurants), and home consumers. For example, one Prince Rupert salmon gillnet fisherman has struck a strategic alliance with a high-end seafood restaurant in Vancouver; he sells high quality stunned and bled salmon for which the restaurant pays a higher price.

Self-processing is on the rise.

In other cases, fishermen are self-processing, that is arranging for the custom processing of their fish and then taking responsibility for marketing the finished product. This is becoming increasingly common in the roe herring fishery, after having been the standard practice for the herring spawn-on-kelp fishery for some time.

Geographic Distribution of Sales

The majority of wild seafood products are exported.

About three-quarters of BC wild seafood products by sales value, go to export markets. The remaining one-quarter is divided between sales within BC (15%) and those to the rest of Canada (10%). The export market share and the specific market destination vary with the species and product.

About 50% of wild salmon is destined for export markets with the UK an important market for canned salmon. In contrast, more than 90% of roe herring, herring spawn-on-kelp, and frozen sablefish is exported to Japan. The US is a key market for fresh whole halibut and fresh groundfish fillets. Asian markets predominate for certain shellfish products such as frozen prawns (Japan) and live geoducks (Hong Kong).

Market Cooperation in the Value Chain

Fishermen-buyer cooperation is common in IQ fisheries.

Many fishermen develop a relationship with a particular buyer, especially in IQ fisheries which are market-driven businesses. For IQ fisheries, cooperation helps in scheduling deliveries, meeting buyer specifications for quality and on-board handling, and communicating information on market needs. Activities such as these are essential features of the global food business today.

In contrast, there is much less value chain cooperation in the case of other seafood products, such as salmon. A major contributing factor is the lack of consistent production, quality, and price incentives under current fishing practices and fisheries management.

Niche and Commodity Products

Fishermen can receive much higher prices for high-quality niche products that command high prices in the marketplace and require very little processing on land. Examples are live geoducks and frozen-at-sea (FAS) prawns. In contrast, prices to fishermen are lower for fish destined for low-value commodity markets such as canned pink salmon or hake surimi.

Developing higher-priced niche products is very difficult.

Niche product development by individual harvesters is very difficult. The problem is that an individual harvester's production is very small, is not labelled or "packaged", and loses its identity through processing and other stages of the value chain. However, a group of producers working together along with a processor or marketer could have the production volume, quality control discipline, and marketing expertise to develop a niche product for a specialized market segment (see Case Study 3).

5.1.2 Prices Received

Over the last 20 years, prices in IQ fisheries have risen faster than those in competitive fisheries.

Exhibit 15 displays landed prices to fishermen for selected species from 1982 to 2002. Different trends emerge. Generally, IQ-managed fisheries have shown greater price increases over the past 20 years than have competitive fisheries, including salmon. However, prices in some non-IQ shellfish fisheries, such as prawn and crab, have also shown large price increases. Exhibit A.1 in Appendix A displays catch volumes and values, and by implication prices, for a variety of BC fleet segments.

Salmon

Salmon prices increased from the early 1980s through 1988 when market demand was driven by strong world economies, particularly in Japan, as well as by favourable exchange fluctuations. For example, the average sockeye price to fishermen rose from (per kg round) $2.60 in 1982 to $8.10 in 1988, while the average pink salmon price increased from (per kg round) $0.80 to $1.50 over the same period.

Case Study 3: Chignik Salmon Seine Fishery Cooperative in Alaska

Issue

In the Chignik area on the southern side of the Alaska Peninsula, the value of the sockeye salmon harvest to seine fishermen fell dramatically over the last ten years. Various factors, including competition from farmed salmon, smaller harvest levels, changes in consumer demand, and a worldwide economic slowdown, contributed to this decline. In response, many permit holders began to explore ways to reduce the numbers of boats fishing the available harvest, in order to cut costs and improve quality.

Several Chignik fishermen and a wild salmon processor had visited a BC farmed salmon processing operation, and had observed the holding, handling, and processing techniques required to meet the quality standards of the fresh salmon market. They petitioned the Alaska Board of Fisheries (BOF) in 2002 to allow a cooperative fishery.

Response

The BOF agreed to a one-year experiment and gave the 100 permit holders the option of joining the cooperative – the Chignik Seafood Producers Alliance – or fishing independently. Of these permit holders, 77 joined the co-op and 23 did not. The co-op received an allocation of 69% of the total sockeye harvest (0.9% for each member permit holder) and the other 31% went to independent permit holders. During the 2002 season, the Alaska Department of Fish and Game (ADFG) managed the fishery with separate openings for these two groups. The co-op paid 22 members to fish (about $US 47,000 each, plus fuel and insurance costs) and all 77 members, including those who did not fish, shared the remaining catch value net of labour costs (about $US 22,000 each).

The 22 boats that fished did not actually land the fish on board; rather, the fish were pumped directly from the seine net into circulating seawater in the tender. About 15 tenders were used, or two for every three boats fishing. Part of the co-op harvest was delivered from the tender live into net pens at the plant, where the fish were held until processing. These live fish were bled, processed, and shipped fresh or frozen on demand, for the highest grade of salmon available on the market. The co-op trademarked the name "Castle Cape Reds" to distinguish this premium product and the unique cooperative approach from which it is derived.

The BOF agreed to continue the experiment for 2003. Nonetheless, the cooperative concept is controversial. There has been intense debate concerning: (1) the appropriateness and fairness of the allocation between the two groups; (2) the distribution of costs and profits among co-op members who fish and those who do not; and 3) the decision by the co-op to contract only with Norquest Seafoods, and not with the other traditional Chignik processor, for processing services.

Results

The management innovation for the 2002 fishery did succeed in reducing costs and improving quality. There was a more uniform distribution in the volumes of fish daily delivered to processors in 2002, as opposed to the boom-and-bust pattern of previous years.

In addition, the co-op fishery allowed the manager to fine tune catches to escapement needs. The co-op fleet agreed to daily harvest levels when requested by ADFG, and these daily limits (ranging from 1,000 to 10,000 sockeye per day) were occasionally increased, lowered or removed, as escapement needs were determined. This allowed the authorization of a small-scale fishery (e.g., 5,000 fish), which would not have been possible had the entire fleet of 100 vessels been fishing.

Lessons Learned

The allocation to a cooperative was a new development in the management of Alaska salmon fisheries. There has been considerable interest within the salmon industry and Alaska in the effects of the management change and the co-op, with similar initiatives being considered in other locations (e.g., Prince William Sound). Industry leadership was a critical component in the politics of establishing the coop, and in the business of running it. The BOF's willingness to pass regulations for a Chignik co-op fishery and the ADFG management to escapement levels were other success factors.

Salmon prices have fallen since the late 1980s, with the burgeoning farmed salmon supply.

After 1988, prices underwent a decline. By 2002, the average sockeye price was just under $4 per kg and the average pink price was only $0.33 per kg, a 60% reduction from 1982. (The price spike in 1994 was an anomaly caused by Japanese buyers who, mistakenly believing that there would be a supply shortfall, bid up prices past market-clearing levels. The 1999 spike was due to a very low BC catch of sockeye that year.)

The major reason for today's very low prices is the burgeoning supply of farmed salmon which offers consistent availability, quality, and price. Other reasons include the persistent weak economy in Japan, an important export market for Canadian sockeye, and the large supply of canned salmon from Alaska. Prices for chinook, coho, and chum salmon have also declined, in large part because of the loss of the European frozen salmon market to fresh Norwegian farmed salmon.

Herring

Roe herring prices have also declined due to a market shift in Japan.

Roe herring is mainly processed into roe for sale to Japan, traditionally for the high quality year-end gift pack trade. The soft Japanese economy has weakened sales of what is seen as a luxury item. Younger people in Japan are increasingly buying flavoured roe products that are convenient, lower-priced, and consumed year-round. The decline of the gift market has shifted Pacific product into the lower-priced flavoured roe markets.

The price to herring fishermen peaked in 1996 at $3.50 per kg round, and then crashed to one-quarter of this value two years later. The price has since rebounded and remained relatively stable at about $1.50 per kg for the past four years. This stability reflects the market shift to flavoured products that, besides being sold year-round, show less price variability from year to year than roe destined for the gift pack market.

Groundfish

Prices for halibut and other groundfish have increased with IQ management.

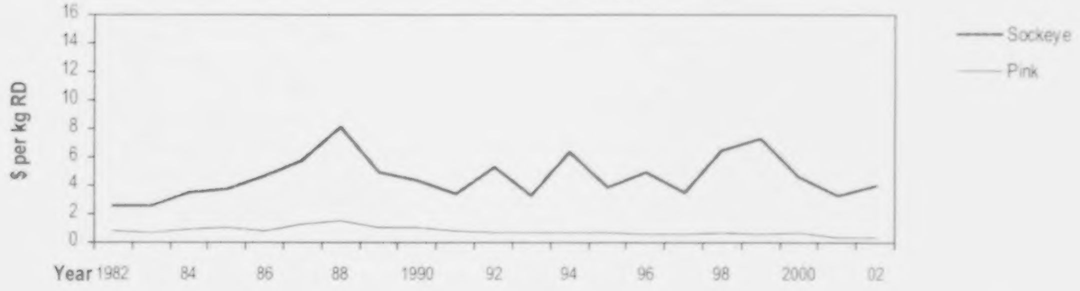
Halibut prices have increased substantially since the introduction of the IQ program in 1991. Prior to the program, the majority of the halibut catch was sold frozen whole by processors because the fishery lasted only ten days or less. However IQ management over a longer fishing period (8 months) has enabled access to the higher-value fresh market.

Groundfish prices have also increased since the introduction of the groundfish trawl IQ program in 1997. More groundfish is now converted into quality fresh fillets, when previously substantial amounts of fillets had to be frozen at the plant due to market gluts. These gluts have been much less frequent under the orderly and predictable fishing pattern of IQ management. This year has seen a drop in price because of the strengthening of the Canadian dollar against the US dollar.

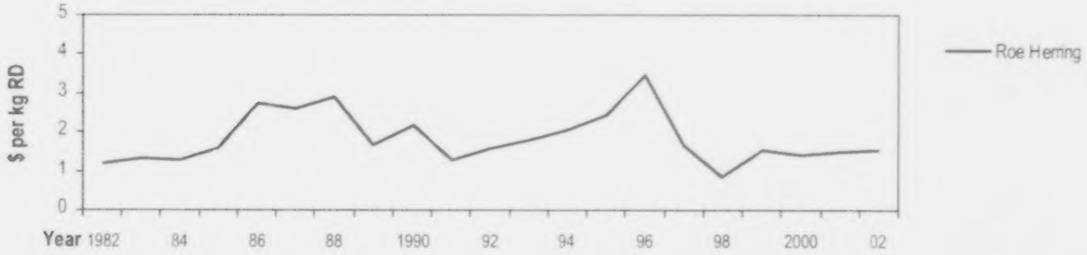
The price of Pacific cod has increased by 50% since the mid-1990s and has tripled since the mid-1980s. These price increases reflect not only the availability of better quality fresh product, but also the decline in whitefish landings worldwide, particularly Atlantic cod, since 1990. Pacific cod, pollock, and other species are filling the market gap. There appears to be strong demand for high-quality whitefish around the globe.

Exhibit 15: BC Landed Prices for Selected Species

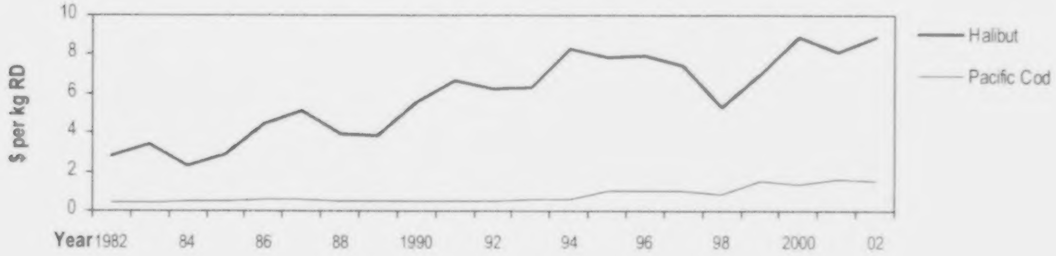
Salmon



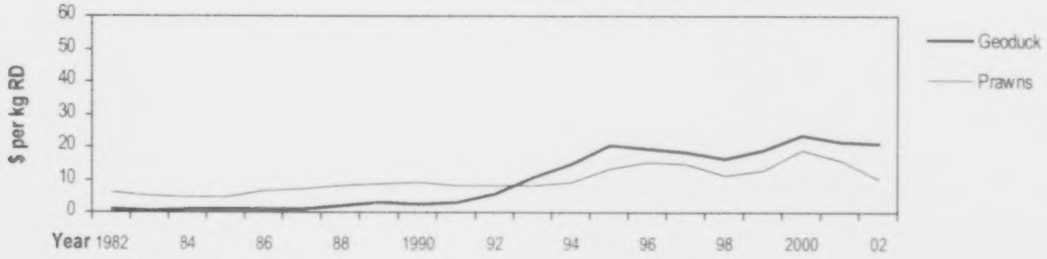
Roe Herring



Groundfish



Shellfish



Shellfish

Geoduck and prawn prices are up substantially as a result of new product and market development.

Geoduck prices to fishermen have increased 20-fold since the early 1980s. Geoduck fishermen were successful in developing a new product (live geoduck) and a new market (Hong Kong). Twenty years ago, much of the geoduck harvested was sold as meat for chowders and the like. In 2003, prices plummeted by 30%, due to the spring SARS epidemic which severely curtailed restaurant sales in Hong Kong.

Prawn prices doubled in the latter half of the 1990s, with the development of a new product and market, frozen-at-sea (FAS) prawns destined for Japan. As well, live prawns are increasingly being sold in Asian restaurants along the West coast of North America. Prices have recently fallen in response to the troubled Japanese economy. Much of BC's shrimp is processed into peeled product. Prices have been low recently due to a glut of frozen shrimp in US and other world markets.

Less is More – The Case of Live Rockfish

A premium market exists in Greater Vancouver and Western North America for live quillback and copper rockfish, and to a lesser extent for China and black rockfish. The market is primarily targeted at people of Southeast Asian descent, and is characterized by seasonality – peaking around Chinese New Year in late January/early February and during the summer wedding banquet season. It is also extremely sensitive to supply conditions. The price for live rockfish is by far the highest price fishermen receive for three different product forms. Although the market for live rockfish is limited, the example does demonstrate the substantial premium prices fishermen can receive for the highest quality product.

Market Product Form	2000 Prices Paid to Fishermen ($/lb RD)
Live	$5.45 per lb (round)
Fresh Whole	$1.37 per lb (round)
Fresh Fillet	$0.60 per lb (round)

* quillback and copper rockfish (usually about 2 lbs each)

Source: GSGislason & Associates Ltd. "The Rockfish Hook & Line ZN Fleet: Landed Prices 1996 to 2000", 2001

Both the geoduck and prawn fisheries are examples of fishermen reaping high prices by serving niche markets that value whole seafood products. The added value derives not from cutting and/or processing the product, but from handling, refrigeration, packaging, and transport to preserve the seafood's pristine quality after harvesting. These two fisheries also exhibit the price volatility that can occur from dependence on a single export market.

5.2 Government Policies and Regulations

5.2.1 Resource Access, Licensing, and Fees

DFO has sole jurisdiction over tidal fish harvesting management in BC.

Under the 1867 *Fisheries Act*, the federal government has sole responsibility for the management of tidal fish harvesting in British Columbia. The underpinnings of Canadian fisheries regulation are licensing restrictions and input controls such as time, area, and gear restrictions. DFO first implemented limited entry licensing in 1969 for the BC commercial salmon fishery. Since then, limited entry has been applied to most of the valuable Pacific fisheries.

Limited Entry Fisheries

Limited entry fisheries are either competitive or quota-based.

Limited entry fisheries fall into two broad classes:

- Competitive – In competitive fisheries, licensed individuals/vessels compete for the available catch.
- Individual quota – In IQ fisheries, licensed individuals/vessels are allocated a predetermined share of the available catch.

There is also herring "pool" fishery management whereby the licensed fleet is divided into pools, each pool receives the same quota, and the pool decides how many boats fish the aggregate quota. This management approach is very closely aligned to IQ fisheries management.

What is a Fishing Licence?

According to DFO (DFO, "The Management of Fisheries on Canada's Atlantic Coast", 2001):

> *A fishing licence is an instrument by which the Minister of Fisheries and Oceans, pursuant to his discretionary authority under the* Fisheries Act, *grants permission to a person including an Aboriginal organization to harvest certain species of fish or marine plants subject to the conditions attached to the licence. The licensee is essentially given a limited fishing privilege rather than any kind of absolute or permanent right or property.*

Most fishing licences can be transferred in practice.

A fishing licence is not owned by the person to whom it is issued; rather, it is the property of the Crown. Strictly speaking, licences cannot be transferred, but in actual practice they do change hands. A person who wishes to transfer his or her licence relinquishes it to DFO and identifies to whom a "replacement licence" is to be issued. DFO will then issue the replacement licence to the person named by the current licence holder.

Pacific Region Licensing

BC fisheries typically follow some general rules.

The Pacific Region commercial fisheries licensing system is characterized by:

- **Limited entry licensing** – Almost all fisheries limit the number of licences and participants in the fishery. Some fisheries operate under IQ fisheries management.
- **Vessel-based licensing** – For most fisheries, licences are attached to specific vessels and the overall allowable length (OAL) of the vessel is specified on the licence. An individual can own more than one licensed vessel.
- **Transferability** – A vessel-based licence can be transferred only to another vessel that does not exceed the OAL of the originating vessel.
- **Marrying of licences** – In a licence transfer, a commercial fishing vessel with more than one commercial fishing licence, e.g., a vessel with both salmon seine ("AS") and groundfish trawl ("T") licences, must transfer both licences to the replacement vessel.
- **No owner-operator clauses** – The owner of a licence does not have to be on the vessel while it fishes that licence.
- **No fleet separation clauses** – Corporations, including those involved in processing, may own fishing licences.
- **Prohibition on mobile fish processors** – The Pacific Region, unlike the East Coast of Canada, does not licence large combination harvest-processor vessels, such as groundfish freezer-trawlers or floating processors.

There are some exceptions to these general rules. For example, roe herring licences are not attached permanently to a vessel and do not have an OAL attached to them. Initially, the herring seine ("HS") and herring gillnet ("HG") licences were non-transferable personal licences with an owner-operator requirement. However, in 1979 the owner-operator requirement was dropped and in 1991 the licence became transferable.

Limited entry licences currently total about 7,468 in BC.

Exhibit 16 indicates the status of commercial licences as of 2002 including aboriginal-held licences. There are currently 7,468 limited entry fishing licences in BC, of which 1,956 (26%) are held by aboriginal interests.

Fees

Licence or resource access fees are paid to DFO.

Licence holders pay a licence fee or a resource access fee to DFO. The fee is based on a percentage of fleet landed value during a base period. The formula is:

- **IQ fisheries** – 5% of the base period price multiplied by the tonnes of IQ allocated, less 40% up to a maximum reduction of $1,000; and
- **Competitive fisheries** – a "stepped" fee comprising $100 up to the first $25,000 in the base period landed value per licence, plus 3% of the next $50,000 in the base period landed value purchase plus 5% of any landed value per licence over $25,000.

The base period for all fisheries is 1990 through 1993 except for salmon licences where a more current base period is used to calculate salmon licence fees. Aboriginal people or bands holding commercial salmon or herring licences may choose to pay a "reduced fee", but such licences can only be transferred to another aboriginal person. Because of the $1,000 offset or credit and the fact that fees are not pegged to current landed value, fees in practice comprise from 2% to 3% of landed value.

A commercial vessel must be registered and obtain a vessel registration certificate. The one time fee applicable at ownership change is $50. Every person 16 years of age or older who fishes as a skipper or deckhand on a commercial fishing vessel in BC must have a Fisher's Registration Card (FRC) and pay an annual fee of $50.

5.2.2 Developments in the 1990s

Four major developments in the 1990s affected the licensing of BC fisheries: a move to quota management, the decline in salmon stocks, introduction of the Aboriginal Fisheries Strategy (AFS), and a shift to fisheries co-management.

The Move to IQ Fisheries

IQ fisheries began in the 1980s.

The trend to IQ management began in the 1980s. The changeover from competitive to individual quota management generally followed four steps:

1. An industry vote or expression of support by licence holders in favour of the concept;
2. The implementation of IQs, with a non-transferability provision, on a trial or temporary basis;
3. A review of the trial program, including a survey or vote of licence holders on satisfaction to date and potential modifications; and
4. Implementation of the program on a permanent basis and permitting of the transfer of licences and quotas, after a favourable vote by the licence holders.

Exhibit 16: BC Commercial Licence Status Report for Limited Entry Fisheries 2003

		Aboriginal-Held Licences				
	Total Licences	"F" Communal	Reduced Fee	Full Fee	Total	% Aboriginal
Salmon						
Seine "AS"[3]	276	12	18	50	80	29.9%
Gillnet[1] "AG" & "N"	1,406	76	418	42	536	38.1%
Troll "AT"	539	19	24	7	50	9.3%
Subtotal	2,221	107	460	99	666	30.0%
Herring						
Roe Herring - Seine "HS"	252	1	51	11	63	25.0%
- Gillnet "HG"	1,271	27	325	2	354	27.9%
Spawn-on-Kelp "J"	46	11	n/a	25	36	78.3%
Subtotal	1,569	39	376	38	453	28.9%
Groundfish & Other Fish						
Halibut "L"	435	26	n/a	27	53	12.2%
Sablefish "K"	48	1	n/a	1	2	4.2%
Groundfish Trawl "T"	142	0	n/a	5	5	3.5%
Rockfish Hook & Line "ZN"	262	14	n/a	5	19	11.1%
Sardine by Seine "ZS"	50	25	n/a	4	29	58.0%
Eulachon "ZU"	16	0	n/a	2	2	12.5%
Category "C"	541	8	n/a	12	20	3.7%
Subtotal	1,494	74	n/a	56	130	8.7%
Shellfish						
Crab "R"	222	9	n/a	2	11	5.0%
Prawn "W"	252	5	n/a	4	9	3.6%
Geoduck "G"	55	0	n/a	1	1	1.8%
Red Urchin "ZC"	110	6	n/a	8	14	12.7%
Green Urchin "ZA"	49	0	n/a	0	0	0%
Sea Cucumber "ZD"	85	0	n/a	10	10	11.8%
Shrimp Trawl "S"	246	11	n/a	4	15	6.1%
Euphausid "ZF"	19	1	n/a	1	2	10.5%
Clam by Hand[2] "ZF"	1,146	0	n/a	648	648	56.5%
Subtotal	2,184	32	n/a	678	710	32.5%
Total	7,468	252	836	871	1,959	26.2%

Notes:

1. *Includes 254 reduced fee salmon gillnet Northern Native Fishing Corporation (NNFC) "N" licences.*
2. *Does not include Haida First Nation and Heiltsuk communal clam licences in which 150 to 300 individuals may be involved in harvesting.*
3. *Does not include 49 aboriginal-operated salmon seine licences owned by processors.*

Source: Michelle James "Native Participation in BC Commercial Fisheries- 2003" Prepared for MAFF, November 2003.

The majority of BC fisheries are now IQ-managed.

Today, about two-thirds of the BC landed value derives from fisheries, including herring pool fisheries, managed under individual quotas. The only major fisheries not under IQ management are the salmon, prawn, crab, and tuna fisheries.

Salmon Stock Declines

The Mifflin Plan and PFAR rationalized the salmon fishery in the late 1990s

In the mid-to-late 1990s, BC salmon stocks declined and consequently, commercial salmon catches, prices, and landed value severely declined. In 1998, there was extreme concern for coho stocks, particularly those in the Fraser River and Skeena River drainages. In response, the federal government rationalized the salmon fishery, first in 1996 through the so-called "Mifflin Plan", and then in 1998 with the Pacific Fisheries Adjustment and Restructuring (PFAR) program (Gislason et al. 1996; Federal Provincial Review 1996; GSGislason & Associates Ltd. 1998). The June 1998 program also included an adjustment program for industry workers.

The Mifflin Plan implemented area and gear licensing for the salmon fleet (2 areas for seine, 3 for gillnet, 3 for troll) and allowed stacking of more than one licence onto a single vessel. A key part of the federal government initiatives in 1996 and 1998 was the purchase or retirement, on a voluntary basis, of commercial salmon licences. The $280 million buyback program resulted in a substantial decline in fishing vessels and licences. The number of commercial salmon licences in BC halved from approximately 4,400 to 2,200 between 1995 and 2000.

Aboriginal Fisheries Strategy (AFS)

The Aboriginal Fisheries Strategy was a response to the 1990 Sparrow decision.

First announced in 1992, the *Aboriginal Fisheries Strategy* resulted from the Supreme Court of Canada's 1990 Sparrow decision which clarified the aboriginal right to fish for food, social, and ceremonial purposes. Under the AFS, DFO entered into agreements with aboriginal groups to address: 1) joint management including regulation of fishing surveillance and catch monitoring; 2) financial contribution to cover infrastructure and training costs; and 3) specific salmon allocations of two types.

The AFS established "F" licences and Pilot Sales Agreements.

For the first type of allocation, the federal government purchased commercial licences from existing fishing participants and transferred them to First Nations or aboriginal organizations as communal "F" category licences. These "F" category licences were to be fished under the same rules as the regular commercial fishery.

The second type of allocation was Pilot Sales Agreements (PSA), which gave specific First Nations on the Fraser and Somass Rivers exclusive time-limited rights to catch specific quantities of salmon in-river, in areas where the regular commercial fishery was not allowed to operate, for commercial sale. Some commercial licences also were purchased from existing participants in establishing the PSA.

The PSAs were controversial. Participants in the regular commercial fishery argued vehemently that the agreement eroded their rights and income and created a separate commercial fishery based on race, in violation of the 1982 *Constitution Act*. In July 2003 the BC Provincial Court ruled the PSA to be illegal. DFO is appealing the decision.

Case Study 4: 2002 Barklay Sound Commercial Seine Fishery

Issue

During the early 1990s, sockeye salmon stocks declined dramatically in Barklay Sound on the West Coast of Vancouver Island. After peaking at almost two million fish in 1991, sockeye returns fell by ten times to only 200,000 returning fish in 1995. There was no commercial seine fishery in the Sound between 1994 and 2001. Then in 2002 DFO identified the opportunity to have a limited sockeye seine fishery in Barklay Sound Area 23. However, the Department was not willing to accept a competitive fishery for all 159 southern licensed seine vessels, as such a large fleet was considered unmanageable.

Response

A seine fishermen's association suggested a way to match fleet size to size of the fishing opportunity. The pilot initiative for 2002 entailed:

- designating weekly catch targets or total allowable catches (TACs) for the total commercial sector;
- consulting with the three commercial sectors (seine, gillnet, and troll) on splitting the weekly TAC;
- segmenting 159 seine licences into eight working groups;
- designating approximately one seine vessel to catch each 2,000 to 3,000 TAC component;
- validating all catches through a dockside monitoring program (DMP); and
- implementing "catch-up/make-up" for underages/overages from one week to the next.

Results

As a result of the industry plan, there was a commercial seine fishery in Barklay Sound for the first time since 1993. The aggregate TAC of 205,000 sockeye was met exactly. The bycatch of 110 chinook and coho salmon was minimal and all were released live. Other benefits included: (1) lower costs; (2) higher quality/shorter trips; (3) no visual gear conflicts; (4) co-management and cooperation fostered among the gear sectors; and (5) the opportunity to test selective fishing gear/techniques. This industry-driven initiative converted the opportunity to fish into a specific allocation. That is, it strengthened property rights to fish for the 2002 season.

Fishing Week (2002)	No. of Days Fished	No. of Vessels Fishing	Total Allowable Catch (Pieces)	Catch (Pieces)
June 16 – 22	1	2	4,000	3,721
June 23 – 29	2	5	20,000	14,624
June 30 – July 6	2	13	40,000	45,954
July 7 – July 13	2	14	40,000	38,915
July 14 – July 20	4	18	60,000	60,915
July 21 – July 27	2	13	41,000	41,000

Lessons Learned

The Barklay Sound pilot showed that effective solutions are fisherman-driven. DFO is willing to accept creative approaches as long as the fishery is sustainable, that is: (1) industry can demonstrate its ability to fish to a TAC; (2) an industry-funded catch monitoring or DMP is in place; and (3) the bycatch is controlled. Slowing down the harvest can increase fish quality, but this higher quality fish needs to be handled, processed, and marketed differently.

Co-management and Higher Industry Fees

Co-management agreements are common between DFO and industry.

A large number of co-management agreements have been struck between DFO and industry organizations. In many cases, DFO has required that industry assume responsibility and pay for activities such as dockside monitoring, onboard observers, and enforcement, before it would agree to change the management of a particular fishery from a competitive to an IQ format.

To date, the salmon fleet has been largely exempted from paying management fees and there is relatively little co-management. At the other end of the spectrum, harvesters in the geoduck and sablefish fisheries, which are both IQ-managed with about 50 licences each, pay for a wide spectrum of monitoring, science, and research and development activities (Gardner Pinfold and GSGislason 1999; Edwin Blewett & Associates 2002).

Better industry organization is necessary for continued development of co-management.

The major factor limiting the development of co-management is the lack of an effective industry organization. The shrimp and salmon fisheries have been cited as fisheries in which lack of sufficient common purpose or vision is an obstacle to co-management. This lack of vision includes management reform to better meet the needs of the marketplace (Edwin Blewett & Associates 2002).

The clear trend in BC is towards greater industry co-management and higher cost recovery fees. This, in turn, has given industry a greater say in fisheries management matters (see the example of BC halibut in Gislason 1999).

5.2.3 Allocation

Under the *Constitution Act*, the first priority after conservation of the resource is the right of First Nations to fish for food, social, and ceremonial purposes. This right was confirmed and clarified by the 1990 Sparrow decision.

Only salmon and halibut are covered by formal allocation policies.

Formal allocation policies for residual use by commercial, recreational, and other uses exist for salmon and halibut. In 1999, DFO's Salmon Allocation Policy gave the recreational sector priority access over the commercial sector to chinook and coho salmon, and the commercial sector priority access to sockeye, pink, and chum salmon (DFO 1999). In October 2003, the Minister of Fisheries and Oceans announced that a 12% catch "ceiling" of the total commercial-recreational allowable catch for halibut would be allocated to the recreational sector. In addition, there are growing concerns within the commercial sector over increasing recreational catches of crabs and prawns. To support sustainable fisheries management and the necessary control over total harvest levels, the move to formal intersectoral allocation appears to be the trend.

DFO has established target allocations for the seine, gillnet, and troll components within the commercial salmon fleet. The allocations are expressed as a share of the total coastwide catch of all species on a sockeye equivalent (SE) basis: one SE is the landed value of an average sockeye in the previous year. However, this measure dulls the incentives for individual fleet segments and operations to improve quality and value as any benefits are shared among the entire fleet in future years. In addition, the salmon fleet has eight gear-area licence combinations, not three. The result is that the use of the SE allocation measure has created tension and competing interests within each of the seine, gillnet, and troll sectors.

Commercial salmon fisheries interests assert that DFO's interpretation of the precautionary approach to salmon management results in the reallocation of fishing opportunities to in-river ESSR fisheries (see ESSR catch data in Section 2.2.4).

5.2.4 Uncertainty of Access

Treaty and AFS Issues

Uncertain access due to aboriginal rights and title limits industry development.

The majority of BC's land base is not subject to treaties and, therefore, may remain subject to aboriginal rights and/or title. Currently, many treaties are being negotiated with the province's aboriginal peoples, but the only successful completion in the past 30 years is the Nisga'a Treaty. Fisheries interests cite the uncertainty surrounding the Treaty and AFS processes as a major barrier to long-term planning and investment in the seafood sector (harvesting, aquaculture, and processing).

The vast majority of fisheries and aquaculture interests suggest that, if existing fisheries and aquaculture rights and licences are impaired through treaties, then the government should purchase these rights and licences at fair market value for transfer as part of the treaty settlement process (the "industrial solution"). This practice was followed in the creation of category "F" commercial fishing licences under the AFS. However, this was not strictly followed in developing the PSA component authorizing in-river commercial fisheries for certain First Nations, or when DFO allocated the Heiltsuk First Nation eight commercial spawn-on-kelp licences through an AFS agreement. In the latter case, DFO increased the number of commercial category "J" licences from 38 to 46.

A court case determined that the Heiltsuk Nation had an "existing" aboriginal right to fish commercially for spawn-on-kelp. DFO has interpreted this ruling, identifying an existing aboriginal right, as eliminating the need for compensation to existing users.

Non-Aboriginal Issues

Industry is also concerned about the potential for more users to access the resource.

Industry maintains that its rights and business value are diluted if additional users are, or can be, provided resource access under Ministerial directive. These additional participants could be licensed commercial fishermen (e.g., spawn-on-kelp in BC, snow crab on the East Coast), growth in another fishing sector competing for the same resource (e.g., the recreational fishery), or special allocations under scientific permit (e.g., fish for aquaculture broodstock or live penholdings). The question of access is, therefore, not merely related to aboriginal rights and the AFS.

The key issue is the unfettered discretionary authority vested in the Minister of Fisheries and Oceans. As long as a fishing licence and/or quota is a limited fishing privilege rather than a property right per se, and the Minister can cancel existing licences, issue new licences, or otherwise allocate the resource across user groups at his or her discretion, there cannot be complete security of access to the resource – a stated goal of the BC Seafood Alliance and others. Industry cites this deficiency as a major concern that shortens the business planning horizon, prevents financing of operations (especially for small operations), and lowers business value. As well, uncertainty of access prevents the move to full co-management and reinforces the view of Savoie (Chairman of the Partnering Panel) and others that micromanaging has created a culture of paternalism in Canadian fisheries management (Savoie et al. 1998).

5.2.5 Incentive Programs and Subsidies

Past subsidy programs for harvesting have been removed.

The harvesting sector used to benefit from subsidy programs, such as vessel construction subsidies, accelerated capital allowances, and arguably the salmon licence buyback programs in the late 1990s that were 100% funded by the federal government. These subsidy programs no longer exist.

Fishermen are the only self-employed workers in Canada eligible for EI. Furthermore, the EI benefits paid to fishermen vastly surpass the EI premiums paid by fishermen. In 2002, BC commercial fishermen earned an estimated $115 million in wages, on which $6 million was paid in premiums. That same year, $36 million in EI benefits were paid to BC commercial fishermen. In other words, for every dollar of EI contribution, about six were received in EI benefits.

One can also argue that the DFO Small Craft Harbours (SCH) program, supporting 101 fishing harbours along coastal BC, is a subsidy. Commercial fishing vessel owners pay moorage rates that are far less than recreational vessel owners or other harbour users. The "reduced fee" salmon and herring licences available to aboriginal people are also a subsidy.

5.2.6 Federal-Provincial Cooperation

The federal and provincial governments cooperate through a series of Memoranda of Understanding on fisheries issues (see Exhibit 2 in Section 2). There are also both federal and provincial seats on a series of industry advisory processes (e.g., the Halibut Advisory Board). In 2003, the federal Minister of Fisheries and Oceans, the BC Minister of Agriculture, Food and Fisheries, and the Yukon Minister of the Environment established the Pacific Council of Fisheries Ministers to work cooperatively to resolve issues of common interest.

DFO and the Province are cooperating in new species development and other area..

The provincial government has also worked closely with DFO, as well as industry, on several initiatives related to new product and new commercial species development (e.g., dogfish, tanner crab, sardines). Although DFO has exclusive jurisdiction over the management of tidal commercial fisheries, increasingly the federal and provincial governments are working together on fisheries matters. This has been aided in recent years by the transfer and secondment of senior managers between the two organizations.

The federal and provincial governments have a different management focus.

However, according to interviews conducted for this study, there is a fundamental difference in focus between the two levels of government. DFO is primarily focused on resource management and conservation, often to the exclusion of economic considerations. The Province, on the other hand, sees a healthy resource as a means to create wealth and business opportunity.

A two member federal-provincial task force is providing advice on the integrated management of post-treaty fisheries.

5.2.7 Aboriginal Issues

Licensing provisions encourage aboriginal participation in harvesting.

Aboriginal people are an important component of the fish harvesting sector, comprising about one in four fishing jobs in the province. Special DFO licensing provisions exist to stimulate and preserve aboriginal participation, including:

- the Northern Native Fishing Corporation (NNFC) and associated 254 category "N" gillnet licences that are leased to aboriginal fishermen each year;
- the communal category "F" licence;
- the "reduced fee" licence option for salmon and herring aboriginal licence holders (and the restriction on these licences to be transferable only to another aboriginal individual); and
- the pool of licences reserved for aboriginal people in any newly-licensed fishery (e.g., sardine).

These aboriginal licence holders and fishermen endure the same uncertainty of rights and access as do their non-aboriginal counterparts. In particular, the AFS Pilot Sales Agreements created another user group, without compensation to existing users, which eroded the income earning potential and business value of all licence holders.

5.3 Human Resources

The fishing fleet and number of fishermen have been halved over the past 15 years.

The combination of increasingly competitive seafood markets, globalization, fleet rationalization, and resource declines has reduced the number of fishing jobs and employment. Today, fishing vessels and fishermen number only half of those 15 years ago.

5.3.1 Labour Utilization and Wages

Fishing jobs are seasonal. The fishing time for an individual harvester can last from two to 25 weeks or more (see Exhibit A.1 in Appendix A). Several vessels participate in more than one fishery as there are 7,468 limited entry fishing licences and about 3,000 active fishing vessels.

Jobs and Employment

Harvesting employment totalled 3,410 person-years in 2002.

The 8,375 fishermen with FRCs in 2002 are estimated to have fished for 12 weeks on average, amounting to 0.4 person-years (PYs) of employment. (Thirty weeks fished is assumed to be one PY, allowing for pre- and post-season maintenance, business planning, etc.). The result is 3,410 PYs of employment in the fish harvesting sector in 2002.

		Employment* (PYs)	Wages* ($ millions)	$ per PY
Salmon		950	18	$19,000
Herring		300	10	$33,000
Groundfish		830	44	$53,000
Shellfish	- clams by hand	240	5	$21,000
	- other	1,090	38	$35,000
		3,410	115	$34,000

* includes the skipper

Wages

Crew payment arrangements have changed, dramatically, especially in IQ fisheries.

In past years, crew on BC fishing vessels were typically paid on a share system: the gross value of the catch, less certain expenses, was divided between a "crew share" and a "boat share". However, crew arrangements have changed dramatically in many cases especially in IQ fisheries where quota can be leased. With leasing, the norm is for the cost of the quota to be deducted from gross catch value prior to devising crew and boat shares. That is, the quota receives a share. And, where the quota is not actually leased, the imputed cost of the quota may be used. In other cases, the crew are paid a fixed daily rate (e.g., herring gillnet operations) or on a trip basis (e.g., halibut).

Salmon crew wages are less than half what they were in the early 1990s.

The changes have meant that crew are receiving a decreasing share of the catch value while the licence or quota holder is receiving an increasing share. However, crew members now typically earn more than before because with fleet reduction, vessels catch more fish on average than before and the unit price of the catch has increased substantially. The exception is the salmon fleet where crewmembers today typically receive less than half what they did in the early 1990s. (The total salmon catch value has declined by 75% or more.). In contrast, crewmembers on groundfish trawl vessels or "draggers" can earn substantial incomes of $75,000 or more.

Crews and Licence Leasing

Leasing of licences and quota redistributes catch value from labour to capital.

The annual costs to lease a licence or quota in IQ fisheries can range from 40% (e.g., groundfish trawl) to 80% or more (e.g., roe herring) of the gross revenue potential. The practice of leasing quota is controversial for several reasons:

- It decreases the share of catch value accruing to crew ("labour") and increases the share accruing to the licence or quota holder ("capital").
- The licence holder does not actually have to fish a licence/quota to reap benefits, i.e., the person can lease the quota, stay on land, and be a so-called "armchair fisherman".
- Leasing increases the power of the licence holder and decreases the power of the crew, i.e., causes a shift in the capital-labour balance of power in fishing.
- Debate whether the Crown earns a sufficient return on the public resource.

Without leasing, there would be more vessels/physical capital and labour employed to catch the same amount of fish. In this sense, leasing increases the economic efficiency or net economic benefits of fishing.

The controversy then reduces to the appropriate distribution of benefits among private capital, private labour, and the federal government, or Crown, as owner and steward of the public resource. This is largely a personal and philosophical preference. It is worth noting, however, that DFO does recover a modest 5% resource rent or access fee for IQ fisheries, and does not put to auction the annual privilege of a fishing licence. That is, some economic rent has already been recovered on the quota holding and DFO does not try to maximize its rent collection. Moreover, the leasing of property or rights is common in other segments of the economy, including businesses operating on public or Crown land, e.g., logging, mineral exploration, and tourism in provincial and national parks.

The groundfish trawl fishery has controls to ensure fair payment to crews.

The groundfish trawl fishery is an example where fisheries regulations and policies have attempted to limit the impact of quota leasing on crews. As a condition of the IQ program launch, crew shares are monitored through a compliance-driven process, to ensure that crews are treated fairly in terms of remuneration. In this case, the imputed annual licence lease costs for originally-allocated quota cannot be subtracted from gross revenues before calculating crew shares, as is the norm in other fisheries.

Workers' Compensation

WCB premiums are higher in the commercial fishery than in aquaculture or sportfishing.

The buyer pays Workers' Compensation Board (WCB) premiums on behalf of fishermen. The WCB rate for commercial fishing is higher than for aquaculture or commercial sportfishing operations.

The base rate for the fishing industry is $5.17 per $100 of "accessible earnings", which WCB deems to be 60% of landed value. However, for the BC fishery fleet as a whole, wages to crew total $115 million from $365 million in landed value for 2002 or about 30%.

WCB Premiums on Assessable Earnings 2003

Industry	Per $100 Assessable Earnings
Commercial Fishing	$5.17
Aquaculture	$3.30
Fish Processing	$5.71
Chartered Boat Tours	$1.33
Lodges and Resorts	$1.94

The incidence of WCB premiums discourages worker safety.

The fact that the fish buyer is deemed to be the employer who pays WCB premiums dampens incentives for the vessel skipper and crew to make safety a high priority. In Alaska, vessel owners must obtain private sector insurance coverage to guard against injuries and accidents to the crew. Monthly premiums typically range from $600 to $1,100 per crewmember. The premiums vary with the safety record of the operation.

5.3.2 Recruitment, Skills, and Training

Shift in Skill Requirements and Recruitment

Historically, crew would start working as deckhands at a young age often for a father or other relative and return each year. Some would eventually skipper their own boat. The skipper provided on-the-boat training in areas such as navigation, setting nets, baiting hooks, dressing fish, and operating heavy equipment. The valued crew skill was the ability and willingness to work hard over intense periods of several days, often with little sleep, to help maximize the catch during the competitive fishery opening. The valued skipper skill was an ability to find the fish and keep harmony among diverse personalities onboard. Other valued skills for the skipper and crew were cooking and engine maintenance and/or repair.

Skill requirements have changed for the capture fisheries.

Today's valued skill set is different. The move to IQ fisheries has eliminated the "race for the fish". With more market-driven and technologically advanced fisheries, skippers and crew need additional business planning, marketing, and electronic equipment operating skills. Traditional fishing skills tied to hard work and endurance are less valued, although there are exceptions (e.g., crew on groundfish trawl vessels). Skippers of trawl vessels require substantial skill to meet catch targets for IQ species, while not exceeding ceilings for non-target species.

Lower earnings have affected worker recruitment.

With decreased earnings in the salmon fleet, there is more casual labour and less continuity in the workforce from year to year, and attendant high turnover. Salmon seine boat owners in particular are having a very difficult time finding crew.

Impediments to Change

Older workers and limited education hinder industry growth and renewal.

Fishermen today must be able to change with the industry's shifting requirements, including much greater attention to on-board handling of fish and selective fishing practices and gear. This ability to change is impeded by the advanced age and generally poor education of fishermen. More than 40% of fishermen are 45 years of age or older (skippers are even older) and over half of fishermen do not have high school diplomas (Census of Canada). Literacy skills and English language ability are also an issue for a significant share of the current workforce (Workplace Training Systems 1992).

Better food handling practices are needed to restore BC's quality reputation.

There is a need to improve onboard handling techniques, that is, to better meet food industry standards. For example, in 2002, salmon freezer trollers received $3 per lb. for large chinook salmon dressed head-off. However, the quality was poor since too much fish was put in the freezer during extended trips.

Buyers only noticed the problem after purchase. The result was that BC lost its reputation for quality the price plummeted in 2003 to $1.50/lb. Some buyers switched to Alaskan sources that have invested heavily in improving quality. It will take some time to restore BC's reputation and higher prices. The poor handling issue was not so much an education one. Rather, the problem was the freezer trollers' priority of catching as much fish as possible in the competitive fishery, even at the sacrifice of quality.

Available Training

Certification programs available to fishermen include: the mandatory Marine Emergency Duties or MED, Fishing Master Levels II, III, and IV; First Aid and CPR; Marine Engineer; and Marine Telephone operator. Service providers include BCIT, Northwest Community College, and North Island College. The dive fisheries have specialized training for their divers and tenders.

BC industry has not supported the move to professionalization and accreditation.

There has been a movement to professionalization and accreditation of fishermen in certain regions of Canada which has been supported by DFO. However, all fleet sectors must embrace these concepts and recognize the professionalization agency. This criterion has not been met in BC, in large part due to the service delivery model, but has been achieved in Newfoundland.

A Weak Training Culture

BC's has a weak training culture for the fishery.

In conclusion, the training culture is generally weak in the fishing industry primarily because education and training were not traditionally seen as means of entry or as keys to success. With the dramatic changes in the industry's business environment and the attendant need to adapt, this lack of training culture is a serious deficiency.

5.3.3 Labour Productivity

International competitiveness is important to the fishery in the 21st century, and productivity is a major contributor to maintaining and improving competitiveness. As shown below, the labour productivity of the salmon fishery lags far behind that of the herring, groundfish, and vessel-based shellfish fisheries.

		Landed Value* ($ millions)	Employment* ($ millions)	$ Value per PY
Salmon		57	950	$60,000
Herring		47	300	$157,000
Groundfish		153	830	$185,000
Shellfish	- Clams by hand	5	240	$25,000
	- Other	102	1,090	$95,000
All		364	3,410	$107,000

**Exhibit A.1, Appendix A*

BC's relatively small vessels result in lower productivity.

The average size (length) of BC vessels is small by international standards. As a result, the BC fleet tends to have lower productivity (output per unit fishing capacity and per unit labour) than countries with significant fleet components comprised of larger, offshore fishing vessels that process their catch at sea (GSGislason & Praxis 2001). For example, Iceland, Australia, New Zealand, and Denmark all have higher output ratios and productivity than Canadian and BC vessels. Apart from fleet size, a key difference across countries is the fisheries management system. In particular, Iceland and New Zealand lead the world in IQ quota management; all their key fisheries are IQ-managed.

5.3.4 Management and Labour Environment

Most fishing vessel and licence owners also operate their vessels. In many cases, crew members are family. The owner-operator and family nature of these fishing businesses diminishes the potential for serious labour-management issues.

However, there are some individuals and corporations, including processing companies, who operate a fleet of vessels and hire skippers and crew. In the case of the processor-owned fleet of salmon and herring seiners and groundfish trawlers, there are explicit crew share arrangements that have been negotiated between the major companies and the United Fishermen and Allied Workers' Union (UFAWU). These arrangements include 45% of salmon seine value for sockeye going to the crew and a minimum payment of $300 per short ton to the crew of roe herring seiners.

Price discussions between harvesters and processors have evolved.

In addition, annual herring and salmon price negotiations were held between the UFAWU and the major companies through the processor organization, the Fisheries Council of British Columbia (FCBC). These negotiations were often acrimonious and sometimes resulted in strikes (e.g., in 1975, 1980, and 1989). In recent years, the negotiations have become discussions, as the norm is to roll over the previous year's minimum price parameters. This reflects three changes in the work environment:

- the decline in UFAWU bargaining power with the Mifflin Plan area licensing for salmon and the pool arrangements for herring;
- the shutdown of BC Packers, the largest processor, and the disbanding of the FCBC organization in the late 1990s; and
- the depressed state of herring and especially salmon markets.

Today, UFAWU and the large companies hold discussions on salmon and herring prices that provide price leadership to the rest of the industry.

5.4 *Investment, Financing, and Capital*

5.4.1 Size of Vessels and Technology

Length Class of Vessels

The BC fishing fleet is characterized by relatively small inshore vessels, with 94% of vessels being under 65 feet (19.9m) in length and 44% under 35 feet (10.7m).

2000 Length Class	No. of Vessels	Percent (%)
< 35'	1,477	44%
35' – 44'	1,261	38%
45' – 64'	400	12%
65' – 99'	194	5%
100' +	20	1%
	3,352	100%

The larger vessels over 65 feet comprise mainly salmon and/or herring seine vessels and groundfish trawlers.

Technological Improvements

New materials and technologies have significantly improved the BC fleet.

While vessels were traditionally constructed of wood, over the past 30 years the use of fibreglass, aluminium and steel construction has increased. There has also been a trend to more sophisticated refrigeration equipment (e.g., RSW, freezers), greater electronic equipment (e.g., colour sonar, GPS), and use of hydraulic lifting of gear. In addition, since the mid-1990s significant gear advances have allowed for more selective fishing (e.g., live release tanks for coho and steelhead on all salmon vessels, release grids on shrimp trawlers). The fleet today is much more powerful and sophisticated than 20 years ago.

5.4.2 Investment Levels

Licence and Vessel Values

Licences and quota values make up the largest share of investment in fishing.

To fish requires capital namely a vessel, a licence (and a quota in the case of an IQ fishery), gear, and equipment. Prior to limited entry in 1969, there was no licence and no licence cost. Gradually, as fisheries became more valuable and fleet rationalization programs evolved, the licences and quota acquired a value. Today, licence and quota values dominate the fleet's balance sheet. The following estimates are based on several sources (GSGislason & Praxis 2001; Nelson Bros. 2003).

	Market Value ($ millions)		
	Licences & Quota	Vessel	Total
1990	860	710	1,570
1994	1,140	470	1,610
1998	1,600	300	1,900
2002	1,820	300	2,120

The market value share accruing to salmon and herring operations has decreased from over 75% of the total in 1990 to less than one-third today.

Higher Licence Values in IQ Fisheries

IQ fisheries have seen the most growth in licence values.

Exhibit 17 presents licence value trends since 1990 for selected types of licences. The fisheries with IQ management such as halibut, geoduck, and groundfish trawl, have shown the greatest growth in licence values. The stronger harvester rights implicit in IQs have increased product quality and prices, reduced harvesting costs, and strengthened security of access to the resource, thereby extending the business planning horizon. These benefits have more than offset the additional costs incurred by IQ fleets due to fisheries management and economic rent changes. As a result, licence and quota values for IQ fisheries are up substantially from pre-IQ levels.

Security of access to the resource remains an issue for IQ fisheries.

Nevertheless, as noted earlier these rights for IQ fisheries are not secure. The Minister of Fisheries and Oceans has been reluctant to dilute the rights of existing licence holders through cancellation or issuance of new licences, but has in fact done so on occasion (e.g., issuing new spawn-on-kelp licences in BC and snow crab licences in New Brunswick). This uncertainty has reduced asset values, heightened risk, and increased the target return for industry investment. Security of access is a major concern for the fish harvesting sector.

Government Policy and Licence Values

Government policy affects the number of fishing licences, the terms and conditions under which they can be transferred, the economic viability of the fishery, and several other factors, all of which impact the value of fishing licences.

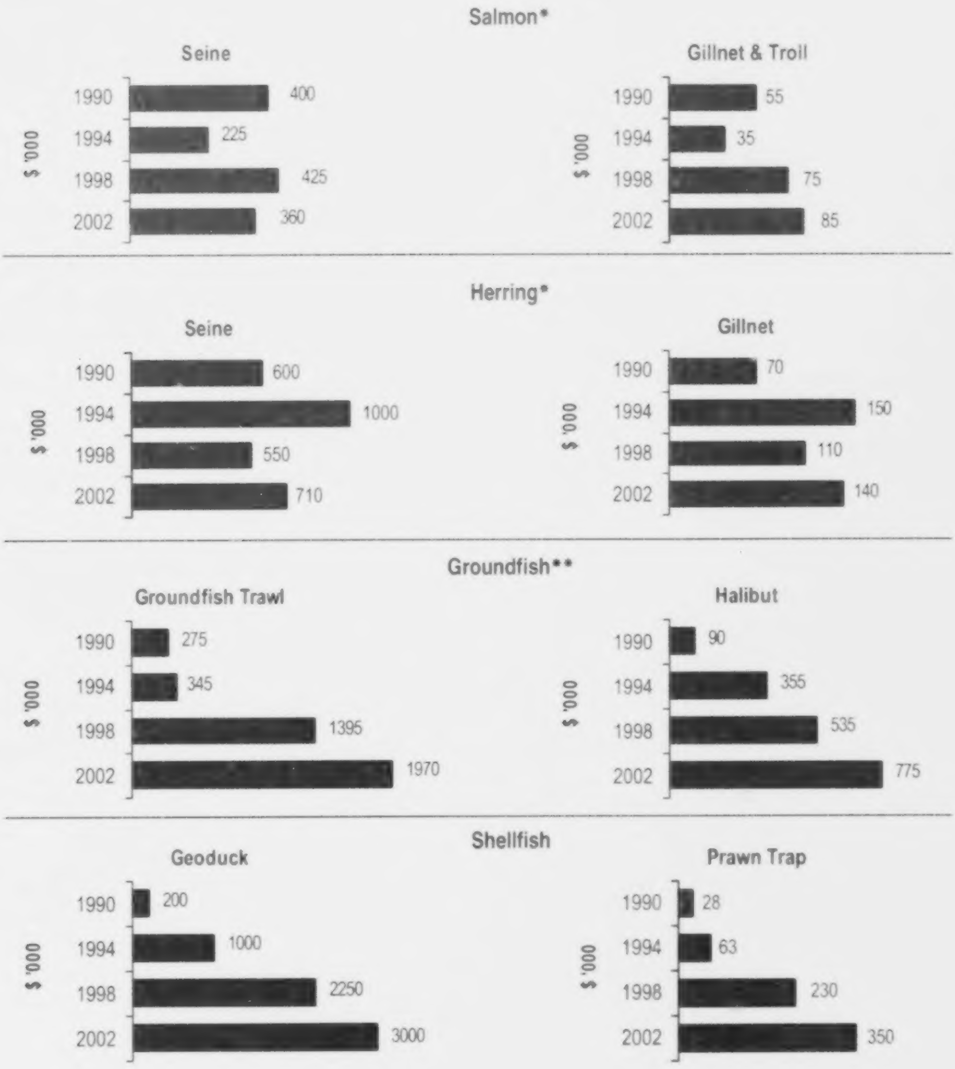
Government policy has increased licence values and improved industry viability.

Licensing. Government policy that permits practices such as the consolidation of fishing privileges on vessels through individual quotas and stacking raises the value of licences and/or quota. First, such provisions expand the pool of potential buyers to include people already in the industry. Second, existing participants can afford to pay more for a licence than a new entrant because fixed costs, such as moorage and insurance, are already met by revenue from the current operation. The additional licence yields a higher net cash flow to an existing participant than to a new participant. Not unexpectedly, many current licence buyers already have a foothold in the industry which was not the case 20 years ago (i.e., high licence values inhibit the entry of young people into the industry). The explicit intent of many government policy changes over the past two decades has been to improve the economic viability of a smaller and more diversified fleet leading directly to higher licence values.

Licence holders have acted to avoid capital gains tax from selling their licence.

Capital Gains. Individuals who sell their fishing licences must pay capital gains tax on 50% of the difference between what they originally paid for the licence (less accumulated depreciation) and the selling price. Since those who paid very little for their licence would be subject to significant capital gains on licence sale, many choose to continue fishing or to lease their licence. Leasing provides an annual income or an annuity and avoids capital gains tax. Licence holders who are willing to sell ask a high price, so that the after-tax income can fund a second career or retirement. Some individuals who sold their licence to the salmon licence retirement program in BC reinvested the proceeds in a non-salmon licence to avoid capital gains tax. The result was to bid up the price of halibut, prawn, and other licences.

Exhibit 17: Selected Commercial Fishing Licence and Quota Values in BC - 1990-2002



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* *Salmon and herring values are full fee licence values.*

** *Groundfish values include quota values.*

Source: GSGislason & Praxis (2001) and Nelson Bros. Fisheries Ltd. (2003).

The federal buyback program and AFS licence purchases have increased licence values.

Buyback and AFS Licence Purchases. The federal government licence retirement programs and ongoing federal AFS licence purchases have increased licence values. Much of this increase has been driven by the salmon licence retirement programs and by federal government purchases of licences for aboriginal treaty settlement or for increased aboriginal participation in fisheries under the AFS. Another repercussion is insecurity in financing. Lenders will not lend money on a non-recourse basis to purchase a licence, and a licence cannot be used as security on loans. This differs from jurisdictions such as Iceland, New Zealand, and Alaska.

5.4.3 Viability and Financial Performance

Financial Returns

The lack of a recent financial survey of the fleet hinders analysis of the harvesting sector.

DFO has not sponsored a costs and earnings financial survey of the BC fishing fleet since the 1994 fishing season. This has severely impaired the ability to analyse the industry and its significant changes over the past decade. Exhibit 18 presents estimated revenues and returns for the four main fleet classes. The estimated returns represent a pure return to capital, since a wage to the vessel operator has been subtracted.

Viability Defined

Viability is an elusive concept for the fishing fleet. For the purpose of this report, viability is defined as the ability to generate sufficient income to provide an adequate long-term return on capital invested. Without a sufficient return on capital, investment will cease and the industry as a whole will decline.

To assess viability requires a quantification of both capital invested and an adequate return. Business viability depends on a number of individual-specific factors, ranging from the type of gear used to the fisherman's debt load. In the short term, a fisherman owning a boat and a licence outright may be satisfied with covering operating costs plus a small return for his or her time. However, this is not sustainable in the long term as there is no provision for capital replacement. A fisherman with bank loans would have to make at least enough money to cover the payments in order to remain solvent.

Financial viability is measured here as pre-tax income and operating income.

For this study, two measures of fleet financial return are employed:

- **Pre-tax Income** (net income before tax) – the return to the owner of the vessel, equipment, and licence(s) after all financial costs, including depreciation and interest and a wage to the skipper, have been deducted; and
- **EBITDA** (earnings before interest, taxes, depreciation, and amortization) – the earnings to provide for debt service, a depreciation reserve, and a return on investment.

Obviously, fishermen do not approach capital spending decisions with only business school principles in mind. Lifestyles and tradition also affect on the decision to enter or remain in the fishing business. Nevertheless, if the long-term returns are not sufficient to allow for capital replacement, the future survival of the industry is threatened.

To simplify the presentation of calculations, return on investment is determined using the measure given by EBITDA (operating income). Investors in small- and medium-sized businesses typically require an operating return of between 15% and 30% on assets. Fishing is a relatively risky business, suggesting that a return above the minimum should be obtained.

Experience in a variety of resource and non-resource sectors suggests a minimum operating income or hurdle rate of 25% of net book value of fishing assets. The analysis also investigates whether the operating return meets the target return of 10% of market value of assets, a common benchmark cited by fishermen.

The target operating income for harvesting as a whole is estimated at $150 million.

The $2.1 billion in market value of fishing assets is estimated to translate to a net book value of $600 million. That is, the target operating return for the harvesting sector as a whole is $150 million (25% of $600 million) or about 40% of the $364 million landed value.

Actual Returns in 2002

The aggregate harvesting sector met both targets for 2002, but the salmon fleet fell considerably short.

Exhibit 18 displays estimated returns for 2002. The fleet as a whole received operating income of $165 million and net income before tax of $115 million from a revenue base of $364 million. Therefore, the harvesting sector in aggregate met its financial targets for that year. The salmon fleet, on the other hand, did not meet its financial targets given a negative net income and a marginal operating income considerably short of target. These very poor returns for salmon drag down the financial returns of the entire harvesting sector.

The herring, groundfish, and shellfish fleets did meet the financial targets. The vast majority of the $165 million operating income accrues to licence/quota holders, including those owners who lease their licence or quota to others.

5.4.4 Access to Financing and Equity

The costs to enter a fishery are high and dominated by licence and quota costs. The total current market value of fishing assets is $2.1 billion or $700,000 for each of the 3,000 active fishing vessels, $600,000 for the licence and quota, and $100,000 for the vessel (Nelson Bros. Fisheries Ltd., 2003).

Licences and quotas can be expensive, but are not recognized as secure assets.

High licence and quota costs present a financing dilemma for fishermen. Banks and other traditional financial institutions do not recognize fishing licences as secure assets and do not make loans for licence purchase. Increasingly, financial institutions are making loans based on cash flow rather than on assets. Existing fishermen can generate greater cash flow than new entrants since most of the fixed costs have already been paid. The new fisherman is at a disadvantage.

Many fishermen must relay on non-traditional financing sources, such as processing companies or family members, for debt financing of licence purchases. Processing companies will often provide loans at favourable terms but, in return, require some form of security (i.e., a covenant on the licence or quota), and access to the licence's production (i.e., through a production delivery contract). The result is processor control over the licence and its production, at least during the term of the loan. Processing companies will also consider joint ownership with the fishermen having the option to purchase the processor share over time.

Exhibit 18: 2002 Financial Returns to the BC Fishing Fleet

	2002 Fleet				
	Salmon	Herring	Groundfish	Shellfish	Total
Assets ($ millions)					
Market Value (MV)					
Licences and Quotas	240	390	800	390	1,820
Vessels	100	50	100	50	300
Total	340	440	900	440	2,120
Net Book Value (NBV)	110	120	250	120	600
Revenues and Returns ($ millions)					
Landed Value	57	47	153	107	364
Operating Income or EBITDA	5	35	75	50	165
Net Income Before Tax	(10)	25	60	40	115
Financial Ratios					
EBITDA to NBV	5%	29%	30%	42%	28%
Net Income to Revenue	(18%)	53%	39%	37%	32%
EBITDA to MV	1%	8%	8%	11%	8%

Note:

1. *NBV estimated as 25% of licence/quota MV + 50% of vessel MV.*
2. *Operating incomes are earnings before interest, taxes, depreciation, and amortization (EBITDA). A wage to the operator has been subtracted.*
3. *Licence lease costs are not treated as a revenue or a cost in the analysis i.e., EBITDA and Net Income include the return to the licence holder.*
4. *There is considerable variation within each group e.g., in groundfish, net returns to sablefish and halibut fisheries would be higher than net returns to groundfish trawl and rockfish hook & line fisheries.*

Source: Market Value of Assets – Nelson Bros. Fisheries (2003).
Landed Value – MAFF & DFO.
Financial Returns and Ratios – GSGislason & Associates Ltd. estimates.

5.4.5 Research and Development (R&D)

Traditionally, BC has been a West Coast fishery leader in developing new technology for catching fish more efficiently e.g., stern ramps on seiners, "red gear" to catch sockeye salmon on trollers.

Selective fishing and sustainability are driving development of new technology.

In recent years, the impetus for R&D on fishing technology has been the need to fish more selectively. This started with the "weedline" experiments in the North Coast salmon gillnet fishery during the late 1980s, and recently has encompassed a variety of initiatives, e.g., the exclusion grates for shrimp trawlers, live fish holding boxes on salmon vessels, "Alaska twist" gillnets. In addition, new catch monitoring systems such as the Electronic Monitoring (EM) systems in halibut and crab fisheries are in various stages of development.

Further research and development will likely continue focussing on selective fishing and sustainability issues. The rising importance of traceability, ultimately back to the vessel and the area where the fish is caught, also is a significant research area.

5.4.6 Overall Investment Climate

Investment is affected by security of resource access and market prices.

The overall investment climate for the BC fish harvesting sector is mixed. For IQ fisheries, the climate generally is much better than for non-IQ fisheries such as salmon, since they have formal catch shares and can plan their harvesting and marketing around these predictable volumes. For salmon, the investment climate is very poor and has been for some time. This reflects the enormous uncertainty around the salmon fishery – the size of the run, how much fish the commercial sectors will be allowed to harvest, and the particular harvest shares accruing to an individual operator. It also reflects the very low salmon prices and returns under current management practice, and the inability to change to make the fishery more market-driven.

For all fisheries there is considerable uncertainty associated with aboriginal land claims, the Aboriginal Fishery Strategy, and security of access to the resource, the Species-at-Risk Act, and other regulatory issues. These factors dampen investment and inhibit long term strategic planning. And industry in general is worried about the effects of the strengthened Canadian dollar on market prices and industry viability.

5.5 Supply Chain Issues and Services

A healthy aquatic environment and resource base is important to sustain a viable harvesting sector. The analysis of Section 4 indicates that the majority of BC fish stocks are healthy but that the status is "mixed" for some species such as coho salmon, lingcod, and shelf/slope rockfish. Uncertainties exist as to impacts of the ocean environment and climate change on fish stocks. Moreover, regulatory policies regarding the Species-at-Risk Act (SARA), the Wild Salmon Policy, and new and emerging species create additional uncertainty.

There do not appear to be any major supply constraints for important goods and services to the BC harvesting sector. With the downsizing of the salmon fleet and other sectors over the past 10 years, there is an abundance of non-licensed fishing vessels and used fishing equipment on the market.

5.6 Catch Monitoring

The IQ fisheries have good catch monitoring, but improvements are needed in non-IQ fisheries.

All the BC IQ fisheries have strong Dockside Monitoring Programs (DMP) where 100% of the harvest is validated at landing. In contrast, the Alaska halibut and sablefish IQ program has only 5 to 10% DMP coverage (GSGislason, "Regulation of the BC and Alaskan Halibut Seafood Sectors", October 2003).

The groundfish trawl IQ fishery has 100% observer coverage to provide information on bycatch and at-sea discards. The halibut longline IQ fishery has about 15% observer coverage and for the last two years has been experimenting with an electronic monitoring (EM) program, a measure that could be very cost-effective relative to onboard observers. The Area "A" (QCI) crab fishery has 100% EM, a measure initiated by industry to prevent poaching of traps.

Non-IQ fisheries such as salmon, shrimp trawl, and prawn trap do not have DMP. Rather there is a myriad of sales slips, logbooks, hail and other measures. Some salmon fisheries do have selected observer programs. The catch monitoring system for commercial salmon fisheries, especially the commercial aboriginal in-river components, require substantial improvement. As with co-management in general, the catch monitoring programs for IQ fisheries are more advanced than for non-IQ fisheries.

5.7 Industry Liaison and Relationships

Several characteristics of fish harvesting, including significant government regulation, perishable food production far removed from the ultimate customer, and small individual production, necessitate a large degree of industry cooperation and trust. Relationships are even more important in the face of consolidation, globalization, and other major forces affecting the world food industry.

Cooperation and trust are highly beneficial, as shown by harvesters who contributed to the IQ fisheries development.

Cooperation and trust is needed among harvesters, between harvesters and government, and between harvesters and processors/buyers. However, they can be foreign words for fishermen, who are fierce individualists and traditional competitors. Nevertheless, many harvesters have seen the benefits of cooperation and a single unified voice in effecting change to the benefit of all. For example, it was geoduck, sablefish, and halibut fishermen who crafted the initial IQ management proposals in the late 1980s and steered them through the birthing process. These sectors demonstrated leadership, as DFO has done in nurturing the process.

5.7.1 Industry Associations

Harvester Associations

With the exception of salmon, most licence holders have formed successful industry organizations.

The majority of BC commercial fisheries licence holders have formed industry organizations to represent the interest of their particular licence class of licence. These organizations are legally registered non-profits that represent the majority of licence holders and have a duly elected Board of Directors and a constitution. Examples include the Pacific Halibut Management Authority (PHMA), Canadian Sablefish Association, and Underwater Harvesters Association (UHA), which represents geoduck licence holders.

These organizations are vehicles for harvesters to discuss and debate broad policy issues, draft resolutions and positions, and present a single voice to DFO and other outside concerns. They are generally cohesive and have been very effective in implementing co-management, including IQ fisheries with DFO.

Case Study 5: The New Zealand Challenger Scallop Fishery

Issue

New Zealand's largest scallop fishery at the north end its South Island peaked in 1975 at more than 200 boats and over 1,200 tonnes landed. When overfishing led to closures in 1981 and 1982, the country's first controlled fishery was introduced, resulting in 48 boats and fewer than 300 tonnes landed in 1983. To help rebuild the southern ccallop fishery, industry formed the Challenger Scallop Enhancement Company (Challenger) in 1994. Since then, the company's role has grown from the provision of enhancement services to active involvement in research, monitoring, and co-management of the fishery.

Response

In 1995, Challenger assumed the government's management responsibility to consult with representatives of the recreational scallop fishery. This resulted in the formation of what would eventually become the Challenger Scallop and Dredge Oyster Recreational Advisory Group, including representatives from dive and marine fishing clubs, the New Zealand Recreational Fishing Council, and residents' associations. Today, commercial and recreational fishers manage the fishery cooperatively, meeting regularly and sharing detailed stock information as well as access to the fishery.

The southern scallop fishery is the only New Zealand fishery exempt from the normal regulatory process of setting TACs, due to the fact that it is managed on a rotational and enhanced basis. Challenger develops the annual harvest management plan with the participation of both recreational and customary (Maori) fishers. Included in the plan are rotational area closures to ensure sustainability and negotiated closures to improve recreational and customary access in local areas. Aside from determining area closures, catch allowances, and size limits, Challenger is responsible for conducting monitoring and enforcement activities.

The company itself is wholly owned by the scallop quota owners with members' voting rights proportional to their quota holdings. Ten elected directors govern Challenger and approve its annual business plan and budget. Funding comes from a commodity levy of up to 25% of landed value collected from processors.

Results

Challenger's success is evident in the degree of cooperation achieved among commercial, recreational, and customer interests in the scallop fishery. To date, there has been full agreement on the annual harvest plan with the exception of one year where a small dispute was settled quickly by the government. In 2001, a difficult year for harvesting, the Recreational Advisory Group gave its support to an extension to the commercial fishing season. In another case, when a line error resulted in a large commercial catch in a residential fishery area, Challenger addressed the concerns of local recreational fishers and the media by committing to reseed the area.

In terms of biomass impacts, catch and recruitment figures indicate that scallop abundance is gradually increasing from the low levels experienced in 1996.

Lessons Learned

The southern scallop fishery is a success story of co-management involving industry and resource users. Key elements contributing to that success include:

- a system for allocating property rights (scallop quotas) that provides an incentive for cooperation and long-term sustainable management;
- a flexible regulatory framework combined with strong leadership from industry and other resource users;
- the willingness of different fishery interests to negotiate in good faith for cooperative access and to resolve disputes internally;
- concerted enhancement and rotational fishing efforts aimed at increasing stocks; and
- an effective research and monitoring program that allows changes in fishery management throughout the season.

The Challenger example also demonstrates the effectiveness of seemingly disparate interests, in this case the commercial and recreational sectors, working together to achieve common resource management goals.

The exceptions are salmon and shrimp. While there are organizations representing the eight salmon area-gear combinations, some are not duly established, some do not represent the majority of licence holders, and some have significant divisions within their membership and leadership. These limitations prevent them from achieving their potential.

Salmon licence holders need a single organization to represent them and work with government.

A bigger issue is the need for a single commercial organization that democratically represents salmon licence holders to consult and work with DFO. As it stands now, DFO does not know with which organization to work. There is an advisory process in place but significant inter-sectoral issues undermine its usefulness. In addition, the process is vulnerable to attacks on its legitimacy, in terms of who do the people around the table represent.

Interviews with harvesters, DFO, processors and others constantly highlighted the need for a unified voice as being critical. There are two somewhat competing visions of how to address this need; 1) the Pacific Salmon Fisheries Initiative, whereby anybody with an FRC can join for a minimal fee ($10); and 2) the Pacific Salmon Harvesters Association attempt to establish eight duly constructed salmon organizations each of which would elect members to serve on a board representing all salmon licence holders. The latter initiative is moving forward and appears more promising.

Commercial Salmon Advisory Board

Eight Salmon Area Councils are currently being formed each with 8 to 12 Directors that are elected by commercial salmon licence holders in the area. Each Salmon Area Council will elect two of their Directors to sit on the Commercial Salmon Advisory Board (CSAB) which also will include 2 individuals from each of United Fishermen and Allied Worker's Union (UFAWU), the Native Brotherhood of BC, and salmon processors. The CSAB will be the main source of consultation with DFO on all matters affecting the commercial salmon industry. The CSAB also will appoint individuals to sit on DFO's Integrated Harvest Planning Committee for Salmon comprised of commercial, recreational, First Nations, and environmental issues.

DFO Advisory Processes

DFO's advisory processes have worked well, again except in the case of the salmon fishery.

DFO has struck a series of broad-based advisory processes and boards that deal with commercial fishing interests, among others. For example, the Herring Advisory Committee, launched in the late 1970s and comprising fish harvesting, processors, First Nations, and other interests, has been crucial to implementing herring management changes. The Halibut Advisory Board (HAB) process was instrumental in ushering in the IQ system for halibut in 1991, and the subsequent change in the fishery. There is general consensus that these processes work well.

Again, the most notable exception is salmon due to the lack of a cohesive voice for salmon licence holders, but industry notes that a major problem with salmon is that there are two dozen or more DFO personnel involved in salmon management and salmon management decisions. DFO itself does not have a single voice and has difficulty internally in developing a position on many matters.

Broad-Based Industry Associations

The United Fishermen and Allied Worker's Union (UFAWU) at one time represented a significant share of commercial fishing licence holders and deckhands, especially in the salmon seine and gillnet, herring seine, and groundfish trawl fleets. Its membership appears to have waned in recent years with the advent of individual species-licences and IQ fisheries, the area licensing management system for salmon, and the attendant rise of harvester associations representing species-specific licence holders.

The UFAWU still serves an important role.

The UFAWU traditionally negotiated minimum price agreements with the large processing companies for net-caught salmon and herring, and crew share arrangements on specific large seiners and draggers. Its price negotiating role has eroded due to changes in the salmon marketplace. However, the UFAWU is still influential and provides an important voice on broad industry issues. (The union is one of the prime movers behind the aforementioned Pacific Salmon Fisheries Initiative.)

The Native Brotherhood of BC (NBBC) represents the interest of aboriginal fishermen, mostly salmon fishermen, and aboriginal shoreworkers. As with the UFAWU, its role in negotiating fish prices has waned in recent years.

The BC Seafood Alliance is seeking collective action for an expanded provincial seafood sector.

The BC Seafood Alliance consists of more than a dozen members and is open to representative associations from harvesting, processing, and aquaculture. One of its goals is to grow the total value of the provincial seafood sector and engage the diverse interests to cooperate in achieving that goal. The organization is providing leadership through building common positions that it then advocates to government and is helping to overcome the traditional fragmentation of industry. The Alliance has also been instrumental in helping member organizations access marketing funds from Agriculture and Agri-Food Canada, and is heavily involved in the seafood value chain strategic planning exercise recently launched by Agriculture Canada.

5.7.2 Integration and Strategic Alliances

Cooperation between harvesters and processors has provided mutual benefits.

Understandably, there is some tension and mistrust between fishermen and processors/buyers. Nonetheless, many do cooperate to a significant degree and have struck strategic alliances. These include joint ownership of boats and licences, the provision of services by processors in return for assured delivery of fish, and, more recently, the scheduling of deliveries. In IQ fisheries, fishermen and processors can coordinate the fishing process to meet the timing, quality, and volume needs of the marketplace. Both sides benefit through higher prices/margins, lower costs, and reduced business risk. Some promising attempts at cooperative fishing and trust-building are being attempted in Alaska and BC (see Case Study 3, *Chignik Salmon Seine Fishery Cooperative in Alaska,* and Case Study 4, *2002 Barklay Sound Commercial Seine Fishery*).

In the salmon fishery, the value and usefulness of fishermen-processor cooperation is impeded by the management system. There is still the competitive race for the fish that tends to emphasize production volumes at the expense of quality and value. As a result, there is broad consensus that the wild fishery often produces an inferior seafood product compared to farmed salmon, in terms of freshness, gutting, and other factors. (For example, there is very little bleeding of wild salmon, while all farmed salmon is bled, a process that improves product shelf life enormously.)

Mistrust between salmon harvesters and processors undermines BC's competitiveness.

Salmon, more than any other fishery on the coast, is still very far from being a market-driven fishery. Market focus is a key tenet of the business model of red meat and poultry producers, salmon's major competitors in the marketplace. In addition, salmon is still characterized by a high degree of mistrust between harvesters and processors that undermines the cooperation needed to be competitive in the food business.

5.7.3 Public Perception

Salmon are special to British Columbians. Beyond their economic importance salmon are part of the intrinsic identity of our province to both those who live here and those who visit from somewhere else. In spite of this emotional attachment, there is the perception that the salmon industry is fractious and subsidized by the taxpayer.

The public's knowledge of BC fisheries is limited.

In contrast, public knowledge and awareness of other groundfish, herring, and shellfish fisheries is very limited. What awareness exists reflects largely environmental concerns and headlines.

To build a more positive public image for salmon will require a new spirit of cooperation and trust. Building trust will take leadership and the setting aside of historic grievances and the present adversarial stances and institutions.

6.0 BC AQUACULTURE INDUSTRY

Aquaculture is the husbandry or raising of fish and shellfish. In 2002, there were 576 licensed marine aquaculture farms (121 finfish, 455 shellfish), mostly on Crown Land tenures covering about 3,918 hectares (1,191 finfish, 2,727 shellfish).

This section builds on the aquaculture profile of Section 2.3, describes farm-level industry performance, and identifies business and competitiveness issues for aquaculture. Competitiveness analysis for any industry ultimately focuses on production levels, costs of production, and prices or market returns. The ideal situation obviously is high production, low unit costs, and high unit prices as described below (the "wishlist" is just as applicable to poultry and many other types of farming).

Desirable Attributes of Aquaculture Species

- closed life cycle
- low juvenile cost
- low FCR (feed conversion ratio)
- low feed cost
- can farm at high density
- fast growing
- good processing yield
- disease resistant
- can stand handling well
- well-known
- high price

Source: Bjorn Myrseth "New Species, Niches and Diversification", Marine Farms ASA, Bergen, Norway 2001)

The BC Ministry of Aquaculture, Food and Fisheries recently sponsored a farmed salmon industry survey of competitiveness, research and development (R&D), and public policy issues (see Exhibit 19).

6.1 Markets

Farmgate values were $289 million for finfish and $15 million for shellfish in 2002.

In 2002 the BC farmed salmon industry produced 85,400 tonnes round weight of salmon – 72,800 tonnes of Atlantics, 10,400 tonnes of chinook, and 2,200 tonnes of coho. Farmed shellfish production for 2002 amounted to 8,800 tonnes round weight – 7,200 tonnes of oysters, 1,500 tonnes of clams, and 100 tonnes of scallops and other shellfish. The 2002 farmgate values for finfish and shellfish totalled $289 million and $15 million, respectively.

6.1.1 Domestic and Export Markets

By regulation, all BC farmed salmon and farmed bivalve shellfish must go through a federally registered processing plant. This applies even for product sold within the province. Accordingly, there are no direct farm sales to buyers. The market analysis of processed farmed salmon and shellfish is presented in Section 7 (Seafood Processing). This section concentrates on farm level activity only.

Exhibit 19: A Competitiveness Survey of the BC Salmon Farming Industry

Background. BC is the world's fourth largest farmed salmon producing region after Norway, Chile, and the United Kingdom and accounts for about 5% of total world production. A survey of the BC industry was conducted to identify: 1) areas where it is not competitive; 2) industry research and development priorities, and 3) suggested priorities for public policy. Nine farming companies responded to the survey, representing more than 95% of total BC production. Five of the companies also operate in other regions of the world.

Competitiveness. Costs of production drive competitiveness, since salmon markets are increasingly becoming commodity markets where individual suppliers are price-takers. Using BC as a base index for comparison, companies operating in other parts of the world ranked regions by relative costs of production as follows:

British Columbia	100.0
New Brunswick	106.5
Norway	95.5
United Kingdom	95.3
Chile	86.8

BC costs are higher than those in all the other regions except New Brunswick. (New Brunswick producers receive slightly higher prices.) This is due to the remoteness of many provincial sites; the lack of economies of scale in smolt production; inadequate access to fast-growing, low-maturing stocks; and regulatory costs. Chile is the world's low-cost producer, due to low smolt, feed, labour, and capital costs.

BC producers ranked proximity to the US and the (until 2003) favourable Canada/US exchange rate highest among the business factors contributing to competitiveness. Availability of professional services was also seen as an advantage. Inhibiting business factors were regulatory issues and costs related to tenure applications, the poor public image of aquaculture, and First Nations treaty negotiations. However, business relationships with First Nations were viewed favourably.

R&D Priorities. The highest-ranking R&D priority was fish health, followed by breeding programs and alternative feeds. The lowest rankings were for research on wild-farmed salmon interactions and, somewhat surprisingly, development of new species.

Suggested Public Policy Priorities. Industry identified improved timelines for application approvals as the highest policy priority, receiving the maximum score possible. Federal-provincial harmonization of the tenure application process also ranked very high. Financial assistance programs and training were given a lower priority. Industry saw improved linkages between wild and farmed salmon sectors as an initiative that the provincial government could promote to improve competitiveness.

Conclusions. BC is a high-cost producer of farmed salmon. Reducing costs of production is imperative for industry survival. Cost reduction is dependent on access to new sites and a streamlined regulatory process for both freshwater and saltwater production phases. The industry needs to expand production and tap economies of scale. It currently suffers from a poor public image that, in turn, inhibits regulatory reform.

Source: PriceWaterhouse Coopers, "A Competitiveness Survey of the British Columbia Salmon Farming Industry", Prepared for MAFF, May 2003

End Products

The main farmed salmon products are fresh-gutted whole fish and "value-added" portions, filets, and steaks. About 70% of the raw fish by weight is sold as fresh dressed.

Two main products are derived from farmed oysters: shucked oysters sold by weight, and whole (live) oysters, destined for the half-shell market, sold by the dozen. In 2002 the total farmgate production by weight was divided roughly equally between these two raw oyster markets. Clams are sold in shell by weight.

Geographic Distribution of Sales

The US West Coast is the primary market for BC farmed salmon, oysters, and clams.

The bulk of BC farmed salmon is sold in the US, particularly West Coast markets, with some product going to Japan. The domestic Canadian market comprises approximately 15% of total farmed salmon sales (10% to BC and 5% to the rest of Canada). About half of BC oysters and over three-quarters of BC farmed clams are exported, again primarily to the US West Coast.

Market Cooperation in the Value Chain

The BC farmed salmon industry, like other food sectors, does have substantial communication and cooperation with other agents farther up the value chain. For example, most farmed salmon is pre-sold before it leaves the farm site for slaughter. The industry tailors its production and deliveries (amounts, timing, fish size, etc.) to meet the needs of the buyer of the processed product.

Cooperation up the value chain is common in salmon farming, but much less so in shellfish farming.

The situation is different for farmed oysters and clams, an industry comprised of much smaller producers. There is substantial mistrust and a lack of cooperation between farm-level producers and processors/ marketers. Often oyster and clam growers will harvest their product and then look for a buyer. In doing so, they run the risk of not meeting buyer specifications, putting product on the market at times of oversupply, and reducing their bargaining power in price negotiations. There is much less marketing expertise and savvy in the BC farmed shellfish sector than the farmed salmon counterpart.

6.1.2 Prices Received

Exhibit 20 displays BC farmgate prices for Atlantic and chinook salmon and for farmed oysters and clams dating from the mid-1980s in $ per kilogram round.

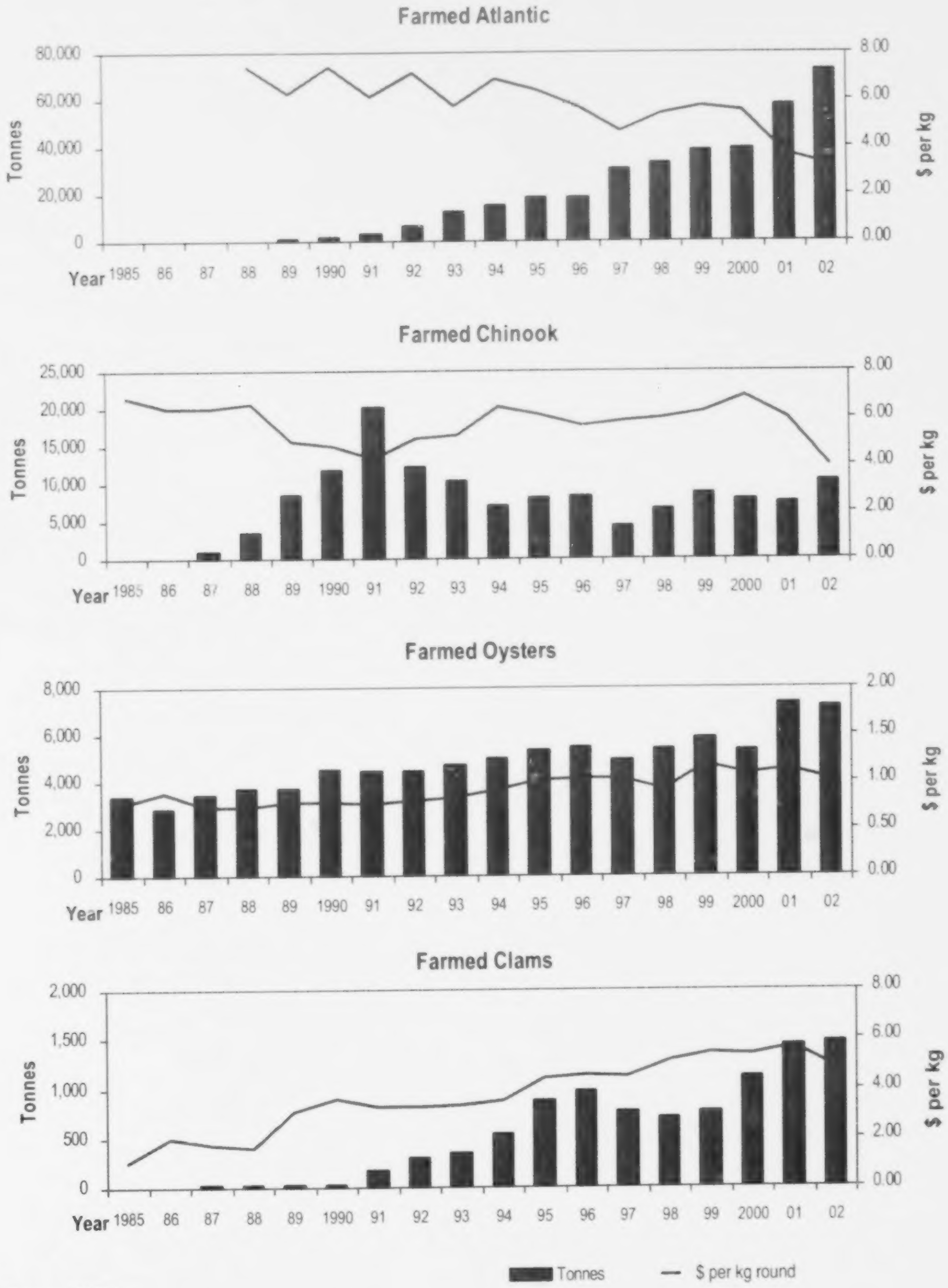
Farmed Salmon

BC farmed salmon, like farmed salmon from Norway and elsewhere, began as a novel, high-priced product. As costs of production fell, the market expanded and farmed salmon became a mass-market protein.

Farmed salmon prices have fallen significantly over the past two decades due to increased supply.

In the latter half of the 1980s, BC farmed Atlantics sold for $6 to $7 or more per kilogram round at the farmgate. By 2002, their average price had declined to $3.27 per kg. While less expensive than Atlantics in the late 1980s, farmed chinook experienced a smaller price decline over time. In 2002 chinook fetched $4.02 per kg, higher than the farmed Atlantic price. The dramatic price declines for farmed salmon since 2000 reflect vastly increased supplies from Chile and other producing countries.

Exhibit 20: BC Aquaculture Production and Farm Gate Prices by Species



Source: MAFF

Farmed Shellfish

Oyster prices were about $0.75 per kg in the late 1980s, increased by a third in the early 1990s, and has ranged from $1.00 to $1.10 per kg since 1995. Prices have been stagnant due to the industry growth in Washington State, a major competitor that produces more than five times BC's oyster production and is closer to the West Coast US market.

Prices have tripled for clams, but have levelled off for oysters because of competition.

In contrast, the price of BC farmed clams has tripled since the late 1980s. The 2002 price was $4.78 per kg, a decline of close to a dollar from 2001 levels. BC clams face less competition from Washington State. Prices for clams are generally strong.

With export sales denominated in US currency, prices for both farmed salmon and farmed shellfish have been hurt by the rising Canadian dollar.

6.1.3 Product Quality and Differentiation

Quality is high for farmed salmon, but less consistent for farmed shellfish.

BC consistently produces high-quality farmed salmon from its cold pristine waters. BC farmed oysters, clams, and scallops also have a very good reputation, but their quality is less consistent. This reflects the many small shellfish growers and the inability to coordinate farm level production, processing, and marketing.

A food product is difficult to brand without packaging. In the case of farmed salmon, it appears that Stolt Seafarms, with its trademarked Sterling brand, is the only company that brands whole fish (through a gill tag on Atlantics). Other companies will label styro package shipments with their name.

Branding is limited for shellfish, and even more so for farmed salmon.

Half-shell oysters are typically identified by location (e.g., Fanny Bay, Cortes Island, Denman Island) when sold at oyster bars and restaurants. On a limited scale, some companies have marketed half-shell oysters on the basis of product attributes (e.g., Summer Ice, Sinku). Shucked oysters sold by container volume by the processor generally lose their identity within the province (i.e., the oysters are sold as product of BC or Canada).

6.2 *Government Policies and Regulations*

6.2.1 Aquaculture Regulations and Fees

Authority

Aquaculture faces many different federal and provincial requirements.

The regulatory framework for BC aquaculture is complex. The industry is subject to 52 separate federal and provincial statutes, regulations, policies, and guidelines as well as numerous municipal and regional land use and development regulatory processes. Questions of jurisdiction often arise because aquaculture, as a relatively new industry, is not referenced in the *Constitution Act*, 1867.

To clarify matters of aquaculture jurisdiction, in 1988 the Province of British Columbia and the federal government signed a Memorandum of Understanding (MOU) regarding aquaculture development. The MOU names DFO as the lead federal agency for aquaculture and MAFF as the lead provincial agency.

Exhibit 21: Federal Regulations Affecting Aquaculture

Law / Regulation	Purpose / Description
Agency: Fisheries and Oceans Canada	
Fisheries Act: Fish Health Protection Regulations	Regulates the movement of salmonid eggs and live salmonids between provinces and into Canada to minimize the introduction of diseases named in the regulations
Fisheries Act Habitat Provisions (s.35)	Avoids harmful alteration, disruption or destruction of fish habitat
Fisheries Act: (s.55) of Fisheries General Regulations	Prohibits the placing of fish, without a permit, in waters other than those from which they came; does not apply in all provinces or govern the interprovincial movement of fish
Fisheries Act: Management of Contaminated Fisheries Regulations	Allows for area closures where there is reason to believe fish are contaminated (e.g., closures under the Canadian Shellfish Sanitation Program)
Navigable Waters Protection Act	Ensures safe navigation; trigger for environmental assessments for works including aquaculture installations
Marine Mammals Regulations	Regulates the protection, management and control of fishing for marine mammals
Oceans Act	Implements a national strategy for the management of estuarine, coastal and marine ecosystems in waters that form part of Canada, or in which Canada has sovereign rights under international law
Fisheries Development Act	Allows the ministry to undertake projects for the more efficient exploitation of Canada's fishery resources
Agency: Fisheries and Oceans Canada (administered by Environment Canada)	
Fisheries Act: Deleterious Substances Provisions (s.36)	Prohibits the deposit of a substance deleterious to fish or fish habitat
Agency: Canadian Food Inspection Agency (CFIA)	
Fish Inspection Act: Fish Inspection Regulations	Governs the safety and quality of Canada's fish products
The Feeds Act: Regulations	Controls feeds including those used in aquaculture
The Health of Animals Act	Protects the health of food producing animals
Agency: Canadian Environmental Assessment Agency (CEAA)	
Canadian Environmental Assessment Act	Requires an environmental assessment before specified projects are undertaken on federal land
Agency: Health Canada	
Pest Control Products Act	Regulates the manufacture, importation, labelling, sale and use of pesticides in Canada; registration of pesticides
Food and Drugs Act: Regulations	Approves the use of veterinary drugs in Canada
Agency: Environment Canada	
Canadian Environmental Protection Act, Part VI	Regulates, through a permit system, the disposal at sea of non-contaminated wastes, including fish waste
Migratory Birds Convention Act	Requires permits to frighten migratory birds from aquaculture sites

Through an MOU, DFO, and MAFF share primary regulatory authority.

Under the MOU, the Province issues aquaculture licences and is responsible for overall development and management of the industry. The federal government maintains regulatory authority for conservation and protection of wild fish stocks and habitat with respect to aquaculture, and protection of navigable waters. In addition, outside of the MOU, federal agencies such as the CFIA and Health Canada maintain their regular responsibilities for food and public health and safety. Federal and provincial regulations affecting aquaculture operations are listed in Exhibits 21 and 22, respectively.

Local governments are also involved in aquaculture regulations through powers granted by provincial legislation (i.e., the *Local Government Act*, the *Vancouver Charter*, and the *Islands Trust Act*). For example, local zoning and land use bylaws may restrict types of property use. Local governments may also require development permits, building permits, and/or business licences.

Tenure and Licensing Systems

Land and Water BC reviews and approves applications for Crown land tenure, with referral to DFO.

Most BC shellfish and finfish farms operate on provincial aquatic Crown land. Three types of aquaculture tenures are available from Land and Water BC (LWBC): an investigative permit, a licence of occupation, or a lease. Each application for tenure is investigated on its merits based on information provided by the applicant, other agencies and groups (e.g., First Nations), and field inspections.

LWBC refers all tenure applications to DFO, which is responsible for environmental assessments under the *Canadian Environmental Assessment Act* (CEAA). A CEAA is triggered when a federal approval, such as a *Navigable Waters Protection Act* (NWPA) approval, is needed. Under the NWPA, DFO is obligated to ensure the public's right to navigation and marine safety in navigable waters. In addition, the federal government assesses the impact of proposed sites with respect to effects on aboriginal rights and land claims, migratory birds, and other user groups. DFO also assesses applications for possible harmful alteration, disruption, or destruction (HADD) of fish habitat under section 35 of the *Fisheries Act*.

US West Coast Shellfish Aquaculture

The states of Washington, Oregon, California and Alaska have produced close to 50,000 tonnes of farmed oysters, clams, mussels, scallops and geoducks worth over $Cdn. 100 million in recent years. Oysters represent 90% by weight and 75% by value of the total. Washington State production comprises about 85% of the total weight and value.

Washington State's industry is much bigger than BC's, is subject to state regulation only, operates primarily on private land using beach culture, and is self-sufficient in terms of hatchery seed. Very few deepwater operations exist because shellfish farming in public waters requires a state permit. Apparently, this involves a process that is even more daunting than the federal-provincial regulatory process in BC.

Exhibit 22: Provincial Regulations Affecting Aquaculture

Law / Regulation	Purpose / Description
Agency: Ministry of Agriculture, Food and Fisheries	
Fisheries Act	Provides for licensing and regulatory control of activities associated with commercial fisheries and aquaculture operations; primary concerns are the licensing of: fish processing plants, fish buying establishments, fishers selling their own catch, wild oyster and marine plant harvesting, and aquaculture operations
Aquaculture Regulation	Governs operational aspects of salmon farms, e.g., frequency of net and containment system inspections, predator control, boat operations, dive inspections, anchoring systems, escape prevention/response, harvesting/processing, documentation and record keeping
Fish Inspection Act	Provides the authority to regulate activities concerning the handling, processing, storing, grading, packaging, marking, transporting, marketing and inspection of fish and fish products
Right to Farm Act: Farm Practices Protection	Protects farmers from nuisance claims; prevents local government from enforcing bylaws dealing with noise, odours, etc., from normal farm practices
Animal Disease Control Act	Administered by the Provincial Veterinarian, provides a statutory authority to limit the spread of contagious diseases in animals, including aquatic animals
Veterinary Drug and Medicated Feed Regulation	Regulates manufacture and sale of medicated feed and veterinary drugs
Agency: Land and Water BC (Ministry of Sustainable Resource Management)	
Land Act	Governs the disposition, management and administration of Crown land
Agency: Ministry of Water, Land and Air Protection	
Waste Management Act	Establishes a basic prohibition against the introduction of waste into the environment during the course of an industry or business activity
Finfish Aquaculture Waste Control Regulation	Provides the legal authorization for all finfish farms to discharge waste, without permits, while ensuring that aquaculture wastes are managed in an environmentally sustainable manner
Wildlife Act (esp. s. 37 re: release of fish in non-tidal waters)	Specific responsibilities outlined include establishing and protecting wildlife management and critical wildlife areas; declaring and protecting endangered species; and regulating the import and export of wildlife
Pesticide Control Act	Regulates the application, storage, disposition and transportation of pesticides; specific regulations spell out requirements
Firearms Act	Regulates the transport and discharge of firearms
Agency: Ministry of Sustainable Resource Management	
Environmental Assessment Act	Provides that proposed projects designated as reviewable projects are subject to an environmental assessment
Water Act	Regulates the use of fresh water systems
Agency: Ministry of Health	
Pharmacists, Pharmacy Operations and Drug Scheduling Act	Provides for registering pharmacists, setting standards of practice, and selling and disposing of drugs that are available for health care in the province

Licensing Farm Production and Operations

A provincial aquaculture licence regulates production and operations.

Once a site tenure is approved, the main provincial mechanism for regulating aquaculture production and operations is the aquaculture licence. This licence is issued under authority of the provincial *Fisheries Act* and the associated Aquaculture Regulation and is administered by MAFF. As well, other permits are required, for example a waste discharge permit from the BC Ministry of Water, Land and Air Protection. Farm operators are required to supply to MAFF annual statistical reports that indicate stocking rates, harvest volumes, and sales by species.

Aquaculture operations require a CEAA environmental screening.

DFO is the lead federal agency and oversees the protection of fish habitats. The Department reviews aquaculture applications to ensure the protection of wild fisheries and the marine environment as well as safe marine navigation. Aquaculture operations must undergo an environmental screening (the most basic level of assessment) under the Canadian Environmental Assessment Act. The CEAA process considers environmental and socio-economic impacts and suggests appropriate measures for minimizing or eliminating potential adverse impacts associated with a proposed activity.

For new aquaculture species, DFO authorizes access to wild broodstock and seed. CFIA must inspect and approve processing facilities for all farmed shellfish and salmon. Environment Canada oversees water quality monitoring of shellfish growing sites.

The siting of shellfish farms is conducted through the review and authorization of a Shellfish Management Plan (SMP) by the provincial and federal governments. Required are a shellfish management plan, Crown land tenure, commercial aquaculture licence, and a federal Navigable Waters permit, in addition to a CEAA review, if applicable. LWBC administers Crown lands and respects the riparian rights of waterfront property owners and First Nations interests.

Canadian Shellfish Sanitation Program

The Canadian Shellfish Sanitation Program (CSSP) is a federal program jointly administered by the Canadian Food Inspection Agency (CFIA), the Department of Fisheries and Oceans, and Environment Canada.

The objectives of the program are:

- to ensure that all bivalue molluscan shellfish are harvested from growing areas that meet the approved federal water quality criteria;
- to recognize and remediate pollution sources, and
- to ensure that harvesting, transporting, and processing are done in an approved manner that reduces the possibility of consumer illness due to contaminated or poor quality shellfish.

The CFIA is responsible for the control of handling, storage, transportation, processing, packaging, labelling, shipping certification, and repacking of shellfish (including imports) to protect against contamination and product quality degradation. DFO is responsible for the enforcement of closure regulations and oversees the opening and closing of shellfhish growing areas. DFO also regulates licences, harvesting locations and times, and minimum harvest sizes. Environment Canada is responsible for monitoring water quality in shellfish growing areas and classifies all shellfish growing areas for suitability for shellfish harvesting. A CSSP Manual of Operations provides information on safety policies and procedures throughout shellfish harvesting and processing and is available through the CFIA website (www.inspection.gc.ca).

The CSSP meets the standards and criteria established in the National Shellfish Sanitation Program, a program administered by the USFDA. As a result, Canada, as well as New Zealand and Chile, are the only countries in the world that are presently approved to export live shellfish to the US market.

Fees

Finfish aquaculture operators pay a variety of fees to the provincial government for processing applications and managing tenure agreements as well as rent or the use of Crown Land or foreshore:

- $100 for each lease, licence, or permit requested;
- $25 for a new aquaculture licence application;
- $150 for each successful tenure application (and $50 for a successful investigative permit);
- $100 or $200 for a successful aquaculture licence (depending on size);
- $250 annual rent for an investigative permit;
- $324 to $587 per hectare annual licence rent for intensive areas (with a 50% reduction in extensive areas); and
- $346 to $563 per hectare annual lease rental for intensive areas (with 50% reduction in extensive areas).

Shellfish aquaculture operators pay a variety of fees to the provincial government:

- $500 for a new tenure application (one-time);
- a $4,500 management fee for successful application (one-time);
- $150 for documentation (one-time); and
- an annual rental fee (the minimum is $600 per tenure which many pay).

Growers also pay property taxes to local government or trusts based on BC Assessment property assessments. Growers can also pay for zoning amendments.

6.2.2 Regulatory Issues and Developments

Regulatory uncertainty is a constraint on industry development.

Meeting the numerous regulatory requirements can be complicated, time-consuming, and expensive for industry. The regulatory climate for aquaculture is uncertain, with a lack of coordination between federal and provincial agencies and inconsistencies in regulatory processes. These regulatory issues add costs, reduce net returns and viability, and stifle industry investment, financing and expansion.

Salmon Aquaculture Review

In July 1995 the British Columbia Environmental Assessment Office launched a review of the operation, regulation, and management of salmon aquaculture in BC. Pending the Salmon Aquaculture Review (SAR), there was moratorium on new salmon farming sites.

Released in August 1997, the Salmon Aquaculture Review Final Report found that, in general, the current state of salmon farming in BC presented a low overall risk to the environment, but that much information was lacking on the issues of fish health, environmental impacts, and the impacts of escaped farmed salmon. The report also noted that regulations and standards had often been inconsistently applied and enforced. It presented 49 recommendations designed to address these issues.

Following the Salmon Aquaculture Review, the moratorium on new farm sties was lifted.

The Province subsequently endorsed the recommendations, and has been working with industry on implementation. In September 2002, the moratorium on new salmon farm sites was lifted.

Greater Regulatory Scrutiny

The aquaculture industry has expressed concern that it faces greater federal environmental review and enforcement than other activities, such as bottom-drag fisheries, that also make use of the aquatic environment and can impact fish resources and habitat. The exemption of some sectors from environmental review not only imposes additional costs on the industry, but also leaves it vulnerable to impacts from those activities. For example, increased sewage discharge (and related degradations of water quality) from recreational boating activities or from expanding coastal housing development may result in the closure of aquaculture sites and increase costs for monitoring programs.

Inconsistent DFO Practices

Some DFO Pacific Region operational practices are hindering industry growth.

There are apparent differences in the application of policies and procedures between DFO Pacific Region and the Department's east coast operations. There are also differences in regulatory costs. According to the 2003 Sadar report (Sadar et al. 2003), West Coast CEAA requirements appear to be implemented as instruments for enhancing habitat protection objectives of the *Fisheries Act*. In addition, the provisions of the *Navigable Waters Protection Act* are being used to hinder aquaculture growth. The Sadar report further states that there is a lack of clear understanding of CEAA by some DFO Pacific Region staff, who may "put their own spin" on CEAA-related requirements, creating unjustifiable delays.

Untimely Delays in CEAA Screenings and Approvals

Long environmental assessments hurt the industry.

The aquaculture industry does not dispute the value of environmental assessments but considers DFO to be slow and ineffective in its CEAA screening and approval procedures. Environmental assessment for an individual farm site can take more than two years. The industry's collective view is that the lack of timely approvals stymies its growth, puts individual companies in dire financial straits, and eliminates employment opportunities for economically disadvantaged coastal communities.

Economic Repercussions of Delays in the CEAA Review Process

In early 2003, Marine Harvest closed the multi-million dollar Wolf Creek Hatchery in Port Edward near Prince Rupert. The company had planned for the chinook smolt production from the hatchery to serve several new Central Coast grow-out sites that were undergoing CEAA review. However, DFO delays in reviewing the site applications meant that the company had to cull 300,000 smolts and lay off 13 full-time employees. Lost job opportunities, many to aboriginal people, also occurred at the grow-out sites and at the processing plant on the Central Coast.

DFO itself admits there is a problem. In March 2003 the Minister of Fisheries and Oceans Canada committed the Department to reviewing and processing 16 high priority farmed salmon tenure applications within six months. Some of these applications had been under review for more than two years. By late September 2003, only five applications(all relocations) had been processed and approved. It appears that DFO does not have the dedicated resources to meet its commitments and responsibilities for CEAA reviews. (DFO has indicated that it has expanded its Pacific Region CEAA staffing several-fold since June 2003 in an attempt to reduce the backlog of applications.)

An inventory of pre-screened Crown land could alleviate CEAA delays.

Some of the delay could be obviated through the establishment of an inventory of pre-screened Crown land to meet industry's immediate needs. Not only could such an inventory identify marine foreshore and deepwater sites, but it could also include upland parcels that have the capability to support tank farm operations and freshwater lakes to support non-anadromous farming and smolt production.

Many existing tenures will be up for renewal in the next three years and industry is apprehensive about how the renewals will be handled under CEAA. In particular, aquaculturists wonder if they will be able to farm during the tenure renewal process.

Access to Shellfish Broodstock

Access to shellfish broodstock is tightly controlled.

Federal policy, rather than regulation, controls access to wild shellfish species. The exception is oysters which are a provincial responsibility. In general, DFO fisheries managers do not allow for the collection of broodstock or juveniles (seedstock) for culture operations. Access may be granted under research permits but generally any species proposed for culture requires access to hatchery-produced seed.

The potential commercial culture of species such as northern abalone is very tightly controlled under Endangered Species legislation. Currently, hatchery, nursery, and culture of abalone are allowed only under special agreement/contract and access to broodstock controlled by permit and any other possession of abalone illegal.

For new shellfish species, CFIA must be assured that the product will not have PSP (paralytic shellfish poison or "red tide") and other biotoxins.

Codes of Practice

The industry has moved to implement best practices.

In June 2001 the BC Salmon Farmers Association (BCSFA) released a Code of Practice containing best practices in a number of areas including waste material, fish mortalities and blood water disposition, fish health, and therapeutants. This had been a recommendation in the SAR report. BCSFA is currently updating the Code.

The provincial government, with industry support, is in the final stages of adopting a Code of Practice for the farmed shellfish sector (the BC Shellfish Growers Association or BCSGA adopted an Environmental Management System Code of Practice in 2001). The BCSGA and the BCSFA codes will together raise standards and performance, comply with applicable laws and regulations, and ensure farming practices meet objectives for environmental sustainability.

Farm Practice Protection Act

In October 2003 the provincial government amended the *Farm Practice Protection (Right to Farm) Act* and the *Local Government Act* to prevent local governments from limiting farming operations, including aquaculture, in ways that violate the intent of right-to-farm legislation. The amendments clarify the law by allowing the province to designate Crown Land suitable for aquaculture as a farming area before aquaculture licences are issued.

Smart Regulation

The federal government is developing a smart regulation strategy.

The 2002 federal throne speech committed the Canadian government to moving forward with a smart regulation strategy. Smart regulation means capturing opportunities by rethinking what and how the federal government regulates.

To help pursue the strategy, an External Advisory Committee on Smart Regulation (EACSR) has been established. Its mandate will be to recommend areas where government needs to improve, expand, or possibly redesign its regulatory approach. The research phase underway will focus on streamlining existing regulations, building federal regulatory capacity, and synchronising regulations between provinces and the federal government as well as between federal departments.

CEAA Amendments

In an effort to deliver environmental assessments in a more certain, predictable and timely manner, the federal government proposed CEAA amendments. Bill C-9, An Act to amend the Canadian Environmental Assessment Act, received Royal Assent on June 11, 2003, and entered legislation in October 2003.

Under the Bill, all assessments will require a federal coordinator to help federal departments and agencies work together and with other jurisdictions. The new legislation will increase opportunities for public and First Nations involvement in the assessment process, and will focus efforts on projects more likely to have significant adverse environmental impacts.

How recent CEAA improvements will affect aquaculture is uncertain.

The effect of the legislation on environmental assessments of aquaculture remains to be seen. While industry welcomes more timely assessment decisions, it is unknown if aquaculture projects will see greater or lesser scrutiny overall.

6.2.3 Incentive Programs and Subsidies

There are no specialized assistance programs for salmon and shellfish growers, such as grants, low-interest loans or tax holidays. In 1998, the federal government created the Office for the Commissioner of Aquaculture Development (OCAD), an agency and industry development program that reports to the Minister of Fisheries and Oceans. OCAD is scheduled to terminate at the end of March 2004.

6.2.4 Federal-Provincial Cooperation

The 1988 federal-provincial MOU clarified matters of federal and provincial aquaculture jurisdiction. In practice, however, coordination and cooperation remains difficult. LWBC places a priority on authorizing aquaculture applications, but this does not appear to be the case for federal agencies.

Harmonization of federal-provincial regulatory processes is essential for industry stability.

Many industry observers consider DFO Pacific Region to have an adversarial approach to aquaculture, and to conduct environmental assessments that are neither fair nor impartial. Harmonization of federal-provincial aquaculture approvals and regulations is essential for industry stability. The current lack of cooperation is clearly adding to the challenges both in the tenure application process and in subsequent farming operations.

6.2.5 Aboriginal Issues

Several First Nations are active in aquaculture in BC.

The Kyuquot, Ahousaht, and Kitasoo First Nations are actively involved in salmon farming through joint ventures. The Kitasoo First Nation also owns and operates a processing plant at Klemtu. Its interests in the salmon farming and processing operations are managed through an economic development corporation that is fully arms length from the Band Council. The Band sees the separation of business and politics as a key ingredient to success (see Case Study 6).

Several First Nations are also active in oyster and clam culture, including the Sliammon First Nation which has productive oyster tenures in Okeover Inlet. Nonetheless, as a general rule, aboriginal participation in aquaculture is much lower than the aboriginal participation in fish harvesting sector. Several studies have noted that there is not a good fit between salmon farming and aboriginal culture, with many First Nations vehemently opposed to salmon farming.

Aboriginal joint ventures are a promising economic development opportunity.

However, finfish and shellfish aquaculture is one of the few economic development opportunities available to aboriginal people that does not require relocation from their home communities Senior government agencies, such as Aboriginal Business Canada and Human Resource Development Canada (HRDC), are beginning to see the strong linkage and business potential between aquaculture and aboriginal economic development. Substantial financial support is likely available for sound business plans and human resource strategies that strive to increase aboriginal participation in aquaculture. Capacity building, at both the entrepreneurial and workforce level, is key.

Despite this promising opportunity, the uncertainty surrounding aboriginal land claims tends to temper investment and business planning in the aquaculture sector. In addition, the Province has an obligation to consult with First Nations that may have traditional use of the foreshore in the Crown Lands tenure application.

It is likely that most new aquaculture operations, and especially finfish operations, will involve joint venture partnerships with aboriginal organizations. The success of the partnerships to date is demonstrable to both the aboriginal people and private sector investors.

6.3 *Human Resources*

6.3.1 Labour Utilization and Wages

Shellfish farming employment is more seasonal and part-time than salmon farming employment.

Since salmon farming occurs year-round, most of its jobs are full-time and full-year. Shellfish farming, on the other hand, is more seasonal and occasional because shellfish do not require feeding and the timing of beach harvests depends on tides. According to a farm-level employment survey conducted by MAFF for 2000, more than one-third of shellfish employment was part-time but only 8% of finfish employment was part-time. However, as the shellfish industry adopts greater technological innovation, more full-time employment opportunities should occur.

Case Study 6: Kitasoo Aqua Farms and Seafoods

Issue

The community of Klemtu on BC's central coast is home to the Kitasoo/Xai'xais First Nation. With the severe downturn of the wild salmon fishery in the mid-1980s, the Kitasoo people recognized the need to diversify their economy. To achieve diversification, they built a modern seafood processing plant and elected to pursue salmon farming as an alternative to their traditional fishery. From its inception, Kitasoo Aqua Farms Ltd. struggled with economic challenges: in 1993 the farm was forced to suspend operations due to low fish prices and a rapidly changing industry. In addition, there has been an ongoing controversy over local salmon farming. Protests by an environmental group and the Nuxalk First Nation have halted the transportation of farmed salmon through the Bella Coola Valley.

Response

To sustain its operation, Kitasoo Aqua Farms sought a multinational partner with a large capital base and investment potential. In 1997 it began negotiations with Nutreco Canada (Marine Harvest Canada), one of the largest salmon and salmon-feed producing companies in the world. The two companies signed an agreement in late 1998 whereby the Kitasoo people hold the tenures and provide the labour for two fish farms, while Nutreco owns the equipment. This agreement has created an additional 17 full-time equivalent jobs for the Kitasoo Band worth $600,000 in annual wages.

The joint venture also involves Kitasoo Seafoods Ltd., which operates the processing plant and is managed by the Kitasoo Development Corporation, an agency at arms length from the Band Council. Since 1985 the company has processed frozen geoducks, sea cucumber, red urchin, wild salmon (fresh and frozen), salmon roe, and herring roe on kelp. In September 2000, it started processing farmed salmon. Kitasoo Seafoods employs 30 FTEs when processing at full operation, contributing about $1 million in wages to the local economy in 2002.

Results

The processing plant and fish farms have been an economic boon to the community. During 2002, more salmon was harvested and processed each week than was produced in an entire year at the pre-partnership farm. Of the 100 Kitasoo employed full-time, 47 work in salmon farming. The partnership has also brought greater capacity to Klemtu: Nutreco, the Kitasoo and North Island College deliver a customized and accredited six-month aquaculture training program in the community. Twelve Kitasoo people graduated from the program and are now working on the salmon farms. Band members are given opportunities and training to rise to management positions at the farms. Young Kitasoo workers are developing increased self-esteem, for the first time feeling that they have options for the future, as many of the skills they acquire will be transferable to other jobs.

Lessons Learned

The Kitasoo ventures are success stories in partnering and economic diversification. The processing plant is capable of handling a variety of seafood products and made a strategic investment in intensive training to bring its crew up to competitive efficiencies of operation. The Kitasoo people were able to acquire the necessary investment capital to keep their farming operations, while maintaining local ownership, jobs, training and other benefits from the salmon farms. To protect traditional food harvesting, they also consulted intensively in the community on siting the farms, addressed the issue of fish waste, and launched their own program of environment monitoring. Transportation remains a continuing challenge, with talks underway with the BC Ferries Corporation to better service community and business needs.

Aquaculture currently provides around 2,400 jobs.

In 2002 the labour profile of the aquaculture industry (hatchery plus growout) was as follows:

	Jobs	Employment (PYs)	Wages & Benefits ($ millions)
Finfish*	1,600	1,410	50
Shellfish*	800	320	8
Total	2,400	1,730	58

** Excludes processing, transport, selling, and general and administration functions covered under processing (Section 7).*

The above figures are only estimates produced by the authors of this report, based on interviews and unpublished research. The Canadian Aquaculture Industry Alliance (CAIA) has acknowledged that the lack of good employment data has impeded its ability to undertake human resource strategies and to demonstrate the industry's economic importance to the public (CAIA 2003).

Farmed Salmon Jobs and Wages

Owners of farmed salmon operations are generally large corporations operating many sites. These companies employ a professional workforce at the farm site and in the administrative office.

Salmon farm site workers earn $2,000 to $3,000 a month.

A farmed salmon site requires farm and maintenance technicians, a site manager and a fish health technician. Starting salaries for these personnel range from about $2,000 per month for the farm technician to perhaps $3,000 per month for the site manager. Experienced people can be paid one-third more than the base salary. Some remote sites operate rotational shifts of workers who live at the site for extended periods and receive room and board.

The core office staff includes a biologist, maintenance manager, accountant, senior site manager, and operations manager. These positions offer base starting salaries of $3,000 to $4,500 per month. Again, experienced personnel can earn one-third more than the minimum. Payroll burden, or benefits above wages, for field and administrative personnel range from 15% to 20%.

BC is a high-cost region for salmon farming labour.

BC is a relatively high wage-cost region. Wage rates in New Brunswick and Chile, for example, are 20% and 80% lower, respectively.

Farmed Shellfish Jobs and Wages

The majority of shellfish farms are small family-run operations with revenues under $50,000. These operations do not farm shellfish full-time or year-round. Most do not hire labour outside the family except at harvesting time. However, there are a few businesses operating several sites that hire ten or more workers, and that have revenues exceeding $1 million annually.

Shellfish harvesting pays about $2,000 per FTE per month.

Harvesting is labour-intensive, done mainly by farm employees in the case of oysters, and contract harvesters in the case of clams. Monthly wage rates are about $2,000 per FTE, including a 10% payroll burden. Contract clam harvesters are paid about $150 to $200 per day.

6.3.2 Skilled Labour and Training

The aquaculture industry requires a knowledgeable, skilled and stable workforce to compete globally in the food business. There is considerable variation in skill level requirements across the aquaculture workforce, from general labourers to highly skilled professionals, such as veterinarians. However, the trend is towards increasing skill requirements for all occupations.

Skill Requirements and Recruitment

Preoccupied with regulation and access to new sites, BC aquaculturalists have had little time for human resource matters. There are significant labour shortages and recruitment issues, particularly for veterinarians, managers, and technicians. Moreover, animal husbandry and mechanical skills are becoming more important and general labour skills less so at the farm site.

Remote aquaculture operations have a hard time recruiting and keeping workers.

While aquaculture often is considered a natural transition for individuals displaced from the commercial fishery, in many cases this is a misconception. Certain parallels exist between the two sectors with regard to the remoteness and maritime nature of the workplace and, to a lesser degree, the use of materials such as nets and rigging. However, the maturing of the farmed salmon industry and a focus more on growing than harvesting demands workers and technicians with highly developed skills and education in fish health and veterinary science, site management, animal husbandry, and mechanical skills. General labour is less valued.

The industry has experienced serious recruitment and staff turnover problems. The remoteness and spartan facilities at production sites pose a barrier to recruiting and retaining employees. Young people are attracted to urban centres with higher incomes and better amenities.

Labour shortages and high staff turnover increases costs and lowers productivity.

Labour shortages mean that there is significant competition among companies to recruit personnel. In BC, many entry-level employees are recruited from outside the province, in part because better aquaculture training is available on the East Coast. The intensity and breadth of education and training for East Coast diploma graduates cannot be currently matched on the West Coast. Further, there appears to be more industry commitment and lower turnover in the case of eastern recruits. BC's labour shortages and high turnover rates add to costs and reduce productivity.

Fisheries and Marine Institute

The Fisheries and Marine Institute is part of Memorial University in St. Johns, Newfoundland. Its Advanced Diploma of Technology Program is a one-year post-graduate applied program that prepares students for a variety of aquaculture careers. Admission requires completion of a three-year diploma program or four-year degree program. Areas of study include site evaluation, business management and communications, marketing, economics, seafood processing, aquaculture systems operations, fish health, fish nutrition, aquaculture engineering, and fish and shellfish culture.

More education, training and recruitment are critical in BC.

The aquaculture industry must find ways to attract and retain young British Columbians. It needs to be seen as offering promising career options and appropriate education, training and certification programs. Recruitment efforts should target individuals who are interested in working seasonally as well as year-round. Skills upgrading programs are also important to keep up with new technologies and help employees understand new quality and safety standards. While potentially expensive, training can save time and money.

Worker Productivity

Productivity appears to be rising, but varies substantially across operations.

Worker productivity is affected by a myriad of factors including technology and mechanization, worker skill levels and diligence, and scale of operation. Productivy in the aquaculture sector is poorly documented but appears to be increasingly. For example, output per farmed salmon worker has risen by one-third since the early 1990s. There is still a large variation in production per worker per hectare, amounting to fivefold or more in the shellfish industry.

Training

Formal aquaculture worker training is currently limited in BC.

Most aquaculture training currently occurs on-the-job in BC. There is little formal training at off-site institutions, and no industry training standards existing for aquaculture workers.

Aquaculture training in BC is currently offered through North Island College, Malaspina University College, and through company and association on-site training initiatives. North Island College in Campbell River offers a certificate program in Salmon Farm Technician positions. Developed and continuously revised through input from BCSFA member companies, this program provides a source of entry-level wrokers. This program has been offered in remote locations such as Klemtu and Kyuquot, in support of First Nation/Industry partnerships. Courses were also piloted through distance education to workers on-site.

Malaspina University College in Nanaimo offers diploma programs in fisheries and aquaculture technology as well as a Bachelor of Science in fisheries and aquaculture. However, program take-up is not large. Malaspina and UBC also have a one-year diploma program in the management of aquaculture production systems. BCIT offers a range of courses related to fish harvesting, processing, and quality and safety. East Coast training institutions, such as the Marine Institute in St. John's, offer the advantage of accreditation agreements with the partner universities, in this case Memorial University.

Malaspina's Centre for Shellfish Research is currently developing a comprehensive operational and business plan for a BC research and training farm that will be dedicated to shellfish aquaculture.

Several studies have addressed aquaculture training needs (Praxis 2002; CAIA 2003), noting that the range of needed skills may expand in the future as the result of:

- commercialization of new species, such as halibut;
- technological change;
- the complexity of environmental and regulatory issues; and
- the increasing size and sophistication of farms, which require advanced management and administrative skills.

Aquaculture workers need food production and marketing training.

These skills requirements, in turn, may require a different focus for training. In particular, the aquaculture workforce requires food production and marketing skills but existing training is largely fishery-related.

Industry partnerships are essential for workforce investment.

The aquaculture industry must build internal partnerships to help coordinate and drive investment in the labour force. At the same time, the industry's diversity, across regions and products, makes it very difficult to bring people together around shared priorities and needs. Building partnerships within industry, and with federal and provincial agencies and affiliated organizations, will help with program development and delivery. Aquaculture can also learn from the experience of other industries that have faced labour skills shortages.

6.3.3 Management and Labour Environment

Labour-management issues are not a problem in aquaculture.

No BC salmon farms are unionized, but one farmed salmon processing plant has a union. Negotiations over wages, benefits, and working conditions are an individual company matter. There do not appear to be any serious labour-management issues. For the shellfish sector, the owner-operator and family nature of many businesses internalizes such issues to a large extent.

6.4 Investment, Financing, and Capital

6.4.1 Investment Levels

Salmon Farm Level Investment

Current information on the investment base of the BC farmed salmon industry is not available. The first and last formal financial survey of the industry was conducted for the 1993 operating year (ARA, 1994). Some information was updated in the mid-1990s for the Salmon Aquaculture Review (Coopers & Lybrand 1997).

At the national level, some investment information is available from the annual reports of publicly traded companies (e.g., Stolt-Nielsen S.A.). The New Brunswick Salmon Grower's Association has sponsored a financial analysis of provincial operations for 1997 (Doane Raymond and ARA 1998) and 2000 (Stewart 2001).

Total investment in BC salmon farming is in the order of $300 to $400 million (original cost).

Based on the above information and growth in BC salmon farming since the 1990s, the industry's 2002 investment base is estimated to be $300 to $400 million on an original cost basis, or $120 to $180 million on a Net Fixed Assets (NFA) basis (where NFA is original cost less accumulated depreciation). These figures include investments in farms and hatcheries but exclude investments in processing plants (plant investment is addressed in Seafood Processing Section 7).

Shellfish Farm Level Investment

Total investment in BC shellfish farming is around $35 to $70 million (replacement cost).

Current investment per hectare in clam and oyster farming ranges from $25,000 to $50,000, including land tenure. The higher end of the range is applicable to clam culture and deepwater oyster culture. The lower end refers to beach culture of oysters. The total replacement cost of capital investment in shellfish culture is therefore $35 to $70 million for the industry's 1,400 active hectares of tenures, of which only about two-thirds are active.

6.4.2 Viability and Financial Performance

Salmon Farming Viability

2002 was a poor financial year for BC salmon farming.

BC salmon aquaculture had a poor year in 2002. Prices were down about 40% from their 2000 levels and some production was culled due to IHN (Infectious Hematopoietic Necrosis) disease outbreaks. Financial returns to the BC industry, as in other jurisdictions, were substantially lower than in 2000.

> **Lower Prices from Increased World Supply**
>
> The demand/supply balance in the EU market in much of 2000 was more favourable to the salmon farming industry in Europe than it had been for several years, resulting in better market prices… At the end of 2000 and into 2001, however, supplies from Chile, the UK, Ireland, and the Faroe Islands all increased substantially, causing a sharp imbalance in the supply into the market, and this has resulted in sharply reduced prices in all markets. For 2001, prices were some 30% lower in Europe and 40% lower in the US compared to levels in 2000. In 2002, prices in Europe were a further 10% lower than on average in 2001, and in the US market some 10% lower than in 2001.
>
> Stolt Nielsen A.A., *Annual Report 2002*

Shellfish Farming Viability

A recent analysis of BC shellfish aquaculture indicates that in 2002 the industry as a whole earned less than 10% EBITDA on sales and essentially zero cash flow after paying the operator a wage (Salter 2002). This poor financial performance is typical of recent years.

BC shellfish farming should earn around 25% EBITDA.

A reasonable financial target, based on the industry's capital structure, is about 25% EBITDA on sales. Achieving that target will require either a doubling of current production from the existing tenure base or a 50% increase in prices for current production, or some combination of the two. The target is very unlikely to be achieved without fundamental changes in both regulatory and industry practices.

6.4.3 Access to Financing and Equity

There is limited formal information on financing of BC aquaculture operations. In 1995 banks and trust companies held the largest percentage of debt for aquaculture producers and suppliers in Canada (Cormier and Tillapaugh 1998).

Salmon Farming

Access to capital is not a problem for most BC salmon farms.

The majority of BC salmon farming operations are owned by large food production companies, many international in scope. Some are publicly traded. As a result, the industry generally has access to banks and other traditional lending sources for financing and to parent companies and capital markets for equity. Provided that the business fundamentals are strong, financing does not appear to be an issue for salmon aquaculture.

Shellfish Farming

BC shellfish farming companies, in contrast, are much smaller and less sophisticated. Normal financing vehicles include the Farm Credit Corporation (FCC), banks and credit unions. In some cases, private investors supply equity capital. No BC shellfish company is publicly traded.

Lending practices differ by institution. Some consider site productivity and tenure value while others primarily consider cash flow. Typically, 35% to 50% equity is required. The FCC will typically provide financing up to $30,000 for start-up growers, and larger amounts to established operations.

Inadequate business plans and other barriers limit access to financing for shellfish operators.

The authors' discussions with lending agency representatives indicate that many loan applicants do not have a viable business plan. Many prospective plans lack key information, such as to whom the grower intends to sell the product. Other barriers to financing include:

- **Lack of lease transferability.** LWBC issues leases to operators, but the leases cannot be reassigned or transferred without consent from the Crown.
- **Lack of crop insurance.** Crop insurance is prohibitively expensive and so is generally not carried by shellfish farmers. Site-specific risks to shellfish include harvest closures due to bacterial contamination, PSP blooms, predation, natural disasters, theft, and vandalism.
- **Difficulty in obtaining an evaluation.** An expert appraisal, such as a biophysical assessment, is expensive.
- **Inability to achieve economies of scale.** There is a large difference between the hobby farmer (who relies on family labour) and the commercial operator (with employees and capital for investment) in their ability to cultivate multiple species and/or sites.

BC shellfish growers must expand to be competitive.

In short, growers must develop in size and expand production to reap the cost efficiencies necessary for competitiveness, especially given the recent strengthening of the Canadian dollar against the US dollar. (Most costs are denominated in the former, while most sales are denominated in the latter.) More adept marketing skills are also needed.

6.4.4 Technology and Research and Development (R&D)

Both federal and provincial governments sponsor research in aquaculture. AquaNet is a federally funded program that supports aquaculture research initiatives across Canada in conjunction with university and industry partners. The BC Aquaculture and Environment Fund (the "Aqua E Fund"), delivered by the Innovation and Science Council of BC through the British Columbia Aquaculture Research and Development Committee (BCARDC), provides support for research on the environmental aspects of aquaculture that have been identified to be of concern to British Columbians. Both are recent initiatives and it is too early to identify concrete results.

New technologies have cut salmon farming costs.

To remain competitive, aquaculture companies need to continue to adopt new technology and participate in research and development. The BC industry has made great strides over the past 15 years. For example, automatic feed systems and new improved cage systems for salmon farms have cut costs.

R&D is important in the culturing of both existing and new species. The challenge in farming fish is to replicate the life cycle in captivity (called "closing the rearing cycle"), and at a cost that allows the fish to be sold at a profit. The two main life cycle components are the hatchery phase – broodstock holding and spawning, egg incubation and larval development, and rearing to a juvenile size – and the growout or farming phase, from juveniles to market-ready adults. Typically, the hatchery phase provides the more daunting technical challenge in the growth cycle for new species.

Farmed Salmon

New vaccines and flesh quality research are priority R&D areas.

Vaccine development (e.g., IHN vaccine) and flesh quality research (e.g., Kudoa infection) have been identified by the BCSFA as priority areas for research and development. In addition, a number of innovations and technologies are already in use, or have the potential to change how the aquaculture industry operates. For example, most farmed salmon are currently hauled live to the processing plant, but improvements in dead-haul systems that allow greater salmon densities during transport and reduce the potential of disease transfer would reduce costs, assuming that quality is unchanged.

R&D facilities are lacking in BC.

However, BC lacks facilities for conducting R&D. Existing research facilities are not well equi[illegible] However, the new Centre for Shellfish Research and the new Centre for Aquaculture and the Environment should increase capacity. Also the University of British Columbia, supported by provincial funding, is hiring a Chair in Sustainable Aquaculture.

Based on new research results, the farmed salmon industry is reassessing its CO_2 stunning techniques for slaughter. It appears advisable to dispatch the fish with the minimum of stress, and then to cool them down immediately. As a result, some companies are considering a return to percussion stunning techniques.

The BC industry is experimenting with on-land tanks to assess their production values.

As well, the industry is experimenting with different growout systems. Many environmental groups demand that farmed salmon be contained in tanks on land in closed containment systems. With sea pens, the movement of tides and currents continually brings oxygenated seawater to the pen and the oxygen facilitates the natural remediation of localized waste beneath the net pens. On-land tanks offer the benefit of avoiding interaction between farmed and wild salmon, but require constant pumping of seawater to supply oxygen and remove waste. They are, therefore, expensive to operate. Agrimarine Industries Ltd. currently has an on-land, concrete tank salmon farming operation in Cedar, near Nanaimo.

Aquaculture facilities can also be set in deep water away from shore, referred to as "open ocean aquaculture". Open ocean operations reduce conflicts with other user groups and allow better waste dispersion. However, depending on the site, they must be able to withstand more severe weather and ocean conditions. Environmental and navigational issues also differ. Open ocean aquaculture is well developed in several areas of the world, including Italy and Spain, where conflicts with the tourism industry and/or scarcity of appropriate sites require producers to move far from the coast. The New Brunswick salmon aquaculture industry is active in evaluating the potential for offshore sites.

Farmed Shellfish

Shellfish farming needs faster technology transfer.

According to our interviews, a significant constraint on shellfish farming viability and growth relates to innovation and the application of new technologies. Many growers are using old technology.

Some growers are using new technology such as optical grading systems or a Floating Upweller System (FLUPSY), a floating device that cultures small shellfish seed through their delicate nursery stage. While some growers do innovate and use new technology, they still view their information as proprietary, so that new technology spreads very slowly through the industry. The result is substantial variation in productivity per hectare. To overcome this constraint, the industry requires a way to facilitate technology transfer.

New Species

With technical improvements, there is significant potential for new finfish species.

The markets for white-fleshed finfish products from cold waters appear strong. The BC finfish aquaculture industry is currently investigating technical and regulatory constraints on the development of viable halibut and sablefish farming. Halibut is a desirable fish to consumers for which they are willing to pay a high price but significant technical hurdles remain. With growing demand in the North American restaurant market, one BC company has started to produce sablefish. Another local producer has launched a farmed sturgeon operation.

Farming of new shellfish species must resolve some production-related issues.

In shellfish farming, the major hurdle for new species will be production-related, given strong markets for most species (e.g., scallops, sea urchins, geoduck, sea cucumbers). Mussel production can be expected to increase in BC, as many producers are adding Mediterranean (*Mytilus. galloprovincialis*) and Blue (*Mytilus edulis*) mussels to diversify their product line. The Blue mussel is more of a commodity, while the Mediterranean mussel receives a price premium for its high meat quality and attractive appearance. The industry will face strong competition from frozen, whole Blue mussels from Chile, and Atlantic Canada and New Zealand mussels.

Scallop farming is one of the world's largest aquaculture activities, in terms of both volume and value of production. Scallops command high prices in domestic and international markets. DFO, with BC government financial support, introduced the Japanese scallop (*Patinopecten yessoensis*) in the mid-1980s because of its fast growth rates and established culture methods. However, there remain several production issues that must be resolved.

A number of other species are being considered, or are under early development, for culture in BC.

- ***Geoducks*** are the highest value clam, with strong export market potential, mainly to Hong Kong and China. One company, Fan Seafoods, is culturing geoduck in BC.
- ***Abalone*** production has grown rapidly at the global level, with China being the lead producer. Prices are very high, ranging from $50 to $80 per kg, depending on product form. There are BC pilot abalone operations on Malcolm Island and near Bamfield.
- ***Sea cucumber*** fisheries are found throughout Asia, the South Pacific, New Zealand, Africa, South America, and North America (including BC). Sea cucumbers are a delicacy in China and Japan. In the mid to late 1990s, additional markets emerged for biomedical research. Culture technology in Canada remains in its infancy.
- ***Sea urchins*** have only been harvested wild to date, but BC's resource has already been depleted in some areas. Sea urchin roe is a premium product sold primarily to Japan and other Asian countries. Japanese prices are high.
- ***Kelp and seaweed*** are cultivated primarily for human consumption, but seaweed is also used in feeds, fertilizers, soil additives, and medicines. Prices for seaweed vary depending on the end use, with premium products capable of commanding high prices. One BC producer operates in Bamfield.

- **Cockles** are an indigenous species important to First Nations. They are common in European markets and may have some appeal to the Asian marketplace.

The development of waste products provides multiple benefits.

Another option for the aquaculture industry is to explore ways of optimizing value from waste products. By taking advantage of wastes, producers would gain another revenue source while reducing the cost of waste disposal. For example, waste could be transformed into fertilizer via composting. (Sea soil, produced from fish and forestry waste in Port McNeill, is used as a garden soil enhancer.) Scottish and Chilean companies are making bikinis out of salmon skins.

Other potential products from processing wastes include:

- ***Fish silage***. Silage is highly nutritious and is traditionally fed as a protein supplement to swine, mink and poultry. It is also included as a low-cost ingredient in aquaculture diets.
- ***Fishmeal.*** Fishmeal has historically come from the reduction of high-volume, low-value species such as sardines, anchovies and menhaden. However, as the availability of these species, other sources of fishmeal are being sought.
- ***Nutraceuticals and pharmaceuticals***. These are potential products and contain Omega-3 fatty acids.

New Seafood Preservation Technology

Various technologies around the world are extending shelf life.

Several new technologies for extending quality and shelf life of seafood products are available and in use around the world. Great strides have been made in modified atmosphere packaging (MAP) for seafood. Many of the participants at the 2003 European Seafood Show in Brussels used and promoted MAP products (e.g., traypack live oysters). MAP can increase shelf life by two or more times.

US shellfish companies employ ozonated water to "bubble" oyster meat, a process that reduces slime and bacteria and increases shelf life. Australia is using the sedative "aqui-s" for live fish shipments (wild and farmed) to Asia. This product reduces fish stress, damage and mortalities. Australia appears to be a world leader in aquaculture of high value species, such as prawns, in part due to its emphasis on innovation and research and development (Australia Prime Minister's Science, Engineering and Innovation Council 2002).

High Hydrostatic Pressure technology ("Fresher Under Pressure") refers to a process of immersing foods in water and subjecting them to extremely high pressure of more than 40,000 lbs per square inch. The pressure results in a pre-shucked product and increased food safety, due to the crushing and destruction of natural pathogens. Natural appearance and flavour are maintained.

In our interviews, industry noted that MAP, ozonated water, and aqui-s have not been approved by CFIA for use in Canada (but CFIA notes that industry has not applied to use, for example, ozonated water). This confers an advantage to BC's competitors.

More Development, Not Research

Many people interviewed cited the need to emphasize more the "development" aspect of "R&D". In their view too much R&D has been directed to basic research with not enough effort targeted at concrete applications of new products, new packaging, new equipment, etc.

6.4.5 Overall Investment Climate

The overall investment climate for BC salmon and shellfish farming is weak, with inadequate returns on investment. The commodity status of most aquaculture products, the burgeoning world supply of farmed salmon, and resulting weak prices pose substantial challenges to investment. Moreover, BC's position as a relatively high-cost producer has been exacerbated by the recent rise of the Canadian dollar against the US dollar.

Investment is going to other jurisdictions, such as Chile.

The uncertain regulatory climate, long delays and substantial costs of site approvals, and the lack of harmonization of federal and provincial regulatory requirements all contribute to the perception that investment in BC is a high-risk, low-reward opportunity. As a result, multinational salmon farming companies are investing scarce capital in other jurisdictions, such as Chile.

6.5 *Supply Chain Issues and Services*

6.5.1 Biophysical Capability

BC's biophysical capability could support aquaculture production at least five times current levels.

BC has a very good biophysical capability to grow both finfish and shellfish. Furthermore, at only 3,900 hectares, existing coastline used for aquaculture is miniscule, leaving much room for industry expansion. As discussed below, BC has the biophysical capability to expand aquaculture production fivefold or more.

A high percentage of coastline on the West Coast of Vancouver Island, north Vancouver Island/Broughton Archipelago, Central Coast and North Coast meet good aquaculture siting criteria, for both shellfish and finfish (Coopers & Lybrand 1997).

The provincial government has assessed the biophysical capability of BC waters to support oyster and scallop culture based on 14 environmental variables, including summer and winter water temperatures and salinity. The results indicate ample areas of coastal water capable of supporting industry expansion. They are consistent with the earlier conclusions of a Coopers & Lybrand study (Coopers & Lybrand 1997).

6.5.2 Broodstock, Smolts, and Larvae

Farmed Salmon Smolts

The BC farmed salmon industry supplies all its smolt needs from within the province. Many farming companies have their own hatcheries that produce smolts for growout. A few stand alone hatcheries exist.

Chile's lake rearing of farmed salmon gives it a competitive advantage over BC.

Smolts are much cheaper to produce in a lake-rearing environment than in land-based tank systems. However, much of BC smolt production is land-based due to regulatory difficulties in accessing lakes for rearing. In contrast, Chile has a predominantly lake-rearing system, which gives it a competitive cost advantage over BC production.

Shellfish Seed

Over 90% of clam and oyster seed or larvae are purchased from Washington State. While there are currently no difficulties in accessing this critical input, BC producers are potentially vulnerable because of dependence on foreign supply sources.

Broodstock and Hatcheries for New Species Development

Aquaculture has reasonable access to wild stocks for broodstock.

Access to BC wild stocks for aquaculture broodstock is an emerging issue and policy area. Understandably, the commercial industry does not wish to see part of the total allowable catch allocated to aquaculture operations, especially at zero cost, given that the wild fishery pays substantial co-management fees for dockside monitoring, observers and basic science. At the present time, DFO provides aquaculture with reasonable access, by scientific licence, to assist industry development. For example, the 2003 commercial halibut Integrated Fisheries Management Plan identifies one tonne as the limit for access by the aquaculture industry. A new sablefish hatchery is under development on Saltspring Island.

6.5.3 Feed

Shellfish such as clams and oysters filter feed from the marine environment and do not require feeding. Feed is the major cost of production for farmed salmon comprising a third or more of product sales. Farmed salmon are fed using nutrient-dense, dry feed pellets typically composed of 45% fishmeal and 25% fish oil. Pelagic forage fish such as anchovies caught off the coast of Peru and Chile and in the North Atlantic, North Sea, and the Baltic are a key component of this feed. Farmed salmon feed is supplied by BC companies such as EWOS, Moore-Clark, and Taplow Feeds.

Higher prices for fishmeal cause fish and other protein producers to substitute alternative feed sources.

Increasing demands on forage fishmeal as a feed ingredient would likely drive up the price of feed, which in turn would spur conversion to more vegetable-based feeds. This trend is already occurring. Two-thirds of the world's fishmeal and half of its fish are used to feed poultry, pigs, and other animals.

World Use of Fishmeal and Fish Oil 1999

		Fishmeal	Fish Oil
Aquaculture			
Marine	- Salmon	7%	19%
	- Shrimp	7%	3%
	- Other Marine	7%	9%
Freshwater Carp, Trout, etc.		14%	15%
Poultry, Pigs, and Other Terrestrial		65%	54%
		100%	100%

Source: Wada et al 2002

Fewer fish products are going into aquaculture production.

Feed manufacturers are currently developing products that use higher proportions of vegetable protein and vegetable oil. Today's feed-to-flesh conversion ratio is about 1.1:1 for Atlantic salmon, compared to 3:1 or higher 15 years ago (and a current 2:1 in the case of chicken). Improved feeds may contribute to lower feed costs and higher conversion efficiencies. The industry already has made significant progress in decreasing its use of fishmeal and fish oil.

6.5.4 Other Goods and Services

There do not appear to be any major supply constraints for important goods and services to the BC aquaculture sector. In fact, some farmed salmon supply companies in Campbell River and Nanaimo are selling their goods and services to Chile because of stagnant industry growth at home.

However, there is a shortage of BC technical expertise for culturing new species, which could restrict industry development. It may be advisable to transfer technology through joint ventures with companies operating in other parts of the world.

6.6 *Sustainability Issues*

6.6.1 Feed Issues

Waste

Like other forms of animal protein food production, salmon farms produce waste in the form of uneaten feed and feces. Wastes primarily accumulate in the immediate vicinity of the cage itself, extending 15 to 30 metres beyond the perimeter of the sea pen.

Care must be taken to control wastes from salmon farms.

Excessive waste accumulation can result in conditions harmful for some aquatic species, including the farmed salmon in the cages above. For this reason, salmon farms are located in areas with good tidal flushing. Accumulations are reduced by improving feed digestibility and by accurately monitoring feed to minimize uneaten quantities.

Forage Fish

About one-third of the global forage catch is used for animal feed, with about 30% for aquaculture. World fishmeal suppliers are static; salmon feed manufacturers compete for this finite supply. As noted previously, the majority of fishmeal is used in poultry and other protein production and most fish made into feed is either unsuitable or unappealing as a direct food product for humans. As a result, salmon farming has no appreciable impact on the supply of wild fish available for human consumption.

Pollutants

Feed for agrifood protein, including farmed finfish, beef, pork, and poultry, may contain persistent organic pollutants (POPs) that endanger human health. POPs include polychlorinated biphenyls (PCBs), dioxins, and other substances produced in industrial processes. The release of POPs into the environment has been curtailed by more stringent emissions control, but POPs break down very slowly and are still detectable in trace amounts in most of the global ecosystem. Levels of POPs, stored in fatty tissue, accumulate the higher the animal is in the food chain.

CFIA is confident that POP levels in farmed salmon do not endanger human health. CFIA studies indicate that POP levels in fish feed should not cause POP levels in farmed salmon to exceed the Canadian Guidelines for Chemical Contaminants and Toxins in Fish and Fish Products or exceed USFDA tolerance levels for human consumption.

The salmon farming industry is taking action to reduce PCBs and other pollutants in feed.

Feed manufacturers can reduce POP levels by sourcing fishmeal from low-level areas and by developing methods to reduce pollutants from fish oil used for salmon feed. Using more vegetable products in feed will also reduce the POP content of farmed salmon.

6.6.2 Fish Health

Carotenoids

Carotenoids are added to farmed salmon to promote growth and health.

Wild salmon's characteristic pink to red-orange colour is due to a type of carotenoid (astaxanthin) – the natural pigment found in many red, orange, and yellow foods. Farmed salmon do not have access to the large amounts of small shrimp and fish that consume micro-algae rich in astaxanthin. Carotenoids are added to farmed salmon feed as they have strong anti-oxidant properties and aid in growth, reproduction, and tissue health. They also impart an orange-red flesh colour depending on the formulation. Without carotenoids added to their feed, farmed salmon would have very low survivability, abnormal growth and development, and pale flesh colour.

The most commonly used nutrient for farmed salmon is canthaxanthin, a synthetic carotenoid. Canthaxanthin is also used in poultry feed to give the skin and egg yolks a brighter yellow colour. The Canadian Feeds Act and Regulations limit its levels in feed to 30 grams per tonne (or mg/kg) of feed. Consumers have low risk of adverse effects from consuming approved levels of canthaxanthin.

The industry is addressing health concerns about canthaxanthin.

Some individuals and organizations have criticized the use of canthaxanthin as being unnecessary and possibly harmful to human health. In response, salmon farmers are shifting to greater use of (synthetic) astaxanthin. The BC industry lists carotenoid use on its product shipments. It has also been vigilant in educating the public that carotenoids are essential nutrients and not just colourants per se.

Infectious Hematopoietic Necrosis (IHN)

IHN is a serious health concern for farmed Atlantic salmon in BC.

Infectious Hematopoietic Necrosis is a naturally-occurring viral disease capable of causing high rates of mortality in farmed Atlantic salmon. Native to the Pacific Northwest, it was first observed in Washington state hatcheries in the 1950s. Pacific salmon appear to have evolved a degree of resistance to IHN, but resistance varies with species, viral strain, and age of fish. Since Atlantic salmon evolved in waters free of IHN, they are susceptible to infection. The disease process is very aggressive and acute. The virus ultimately kills the fish by destroying the kidney and spleen tissue. Outbreaks have occurred in Atlantic salmon farms several times in the past twelve years.

More research is needed about IHN and its impacts on farmed and wild fish.

IHN is the primary fish health concern of the farmed salmon industry. No effective vaccines are commercially available, but at least one company has a vaccine that shows promising test results. The industry is hindered by a lack of knowledge about IHN in farmed and wild fish populations, and more research is required. BC salmon farms are tested regularly for IHN as part of a new MAFF fish surveillance program. Affected farms must immediately begin isolation measures. Chinook salmon have a high resistance to IHN and some companies are increasing production of that species.

Sea Lice

Sea lice (*Lepeophtheirus salmonis)* are a naturally occurring parasite in BC coastal waters that can affect both wild and farmed salmon.

Sea lice can result in substantial aquaculture losses.

Sea lice infestations can cause substantial economic losses for salmon farmers due to mortalities, reduced growth rates, treatment costs and lower marketability. Farms ensure smolts are free of sea lice before they enter the sea pens, but lice can pass through the netting from migrating wild salmon. Strategic measures to reduce the likelihood of infestation include selecting sites with good flushing and water current, periodically fallowing production sites, and ensuring only a single-year class of salmon at each farm site.

Strict Environmental Monitoring of Salmon Farms

Under its partnership agreement with Marine Harvest Canada, the Kitasoo/Xai'xais First Nation on BC's central coast specified strict requirements for environment monitoring of its salmon farms. Kitasoo Aqua Farms Ltd. has since commissioned ongoing monitoring of the two farm sites in Jackson Pass. The Kitasoo Fisheries Program provides a trained fisheries diving crew and a professional biologist to perform the environmental monitoring. Monitoring standards surpasses those set by government agencies and monitoring is conducted independently of Marine Harvest Canada.

The monitoring includes regular sampling of local seafood (clam, prawns, sea cucumbers), which is sent to CFIA and Health Canada for contaminant determination. To date, no significant impacts have been reported. While Marine Harvest Canada has policies in place to control sea lice in the farm fish stocks, Kitasoo Aqua Farms is collaborating with UBC to develop survey and study techniques for an analysis of the sea lice/farmed salmon/ wild salmon relationships in the area. Kitasoo Aqua Farms is committed to closing down the farms if negative impacts on traditional food harvesting are demonstrated.

Compared to other jurisdictions such as New Brunswick, sea lice have not yet posed a significant problem for farmed salmon in BC. Infestations can be treated by using anti-parasitic compounds, which are strictly regulated and controlled, in feed. While the parasite does not threaten the viability of BC salmon farming, critics claim, despite little scientific evidence, that the dramatic decrease in the 2002 Broughton Archipelago pink salmon returns was due to sea lice infestation caused by wild smolts passing salmon farms during their out-migration.

BC initiatives have been launched to address sea lice infestation.

A number of initiatives are underway, with industry's full support, to monitor, research, and control sea lice. In February 2003, MAFF launched an action plan to minimize risks to wild salmon in the Broughton Archipelago. Baseline sea lice information will be collected from all farms to develop appropriate management decisions. A three-day Science Forum on Sea Lice held at the UBC Centre for Aquaculture and the Environment in 2003 examined technical information and set research priorities. In addition, DFO announced the three-year, $700,000 Pink Salmon Action Plan that will involve monitoring, research and public consultation. The BC Aquaculture Research and Development Committee (BCARDC), using Aqui-E funds, has supported additional research programs on sea lice.

Therapeutant Use in Salmon Aquaculture

With improved management and vaccination programs, the use of therapeutants or drugs in salmon aquaculture has declined dramatically. In comparison to the beef, pork and poultry industries, the annual antimicrobial usage in salmon aquaculture is small.

Antibiotics and other drugs are much less in aquaculture than in terrestrial farming.

While terrestrial agriculture continues to routinely add subtherapeutic doses of antibiotics to feed and drinking water in order to promote growth, salmon aquaculture uses antibiotics only to treat disease. Moreover, salmon farmers have access to only a few drugs by veterinary prescription, while a wide range of drugs and pesticides are readily available to the general public for use in poultry and terrestrial animal-rearing.

Drug residues in farmed salmon and the marine environment are not a threat to human health.

The primary route of drug delivery to farmed salmon in net cages is via medicated feed. Depending on the drug administered, traces may persist in the salmon for a period of time. However, salmon are not harvested until drug residues fall below stringent regulatory standards, and regulatory agencies conduct routine inspections at processing plants to ensure the requirements are being met. Consequently, drug residues in farmed salmon do not pose a human health concern.

Drugs used in salmon aquaculture enter the water column and sediment through waste feed and feces. While residues have been found in wild marine organisms, they are not a threat to the health of either the organisms or humans who may consume them.

Fish Health Management Plans

MAFF requires fish aquaculture facilities to develop up-to-date Fish Health Management Plans (FHMPs), which are enforced for private companies as a condition of an aquaculture licence. A June 2003 document, *Required Elements of Fish Health Management Plan*, describes fish health information that operators must include in their plans. These requirements include maintaining information on fish, monitoring disease, identifying and managing risks such water quality and vaccination, minimizing exposure to disease, and ensuring appropriate use of drugs and chemicals.

6.6.3 Safety and Traceability

Farmed Salmon Safety

Processors must have a HACCP-based quality control program.

The Canadian Food Inspection Agency (CFIA) oversees the Quality Management Program (QMP), which requires all federally registered fish processing plants to develop and implement an in-plant quality control program. All plants that process farmed fish and shellfish must be federally registered. QMP is based on Hazard Analysis Critical Control Point (HACCP) principles (see section 3.3.2).

Each lot of farmed fish that enters a federally registered processing plant is accompanied by a drug declaration form. In accordance with CFIA's recall procedures, the plant assigns each lot a trip or lot number that is linked to information on the source company, site, pen, harvest transport vessel or truck, and number of fish in the lot. After processing, the fish are packaged in transport containers labelled with bar codes including the trip or lot number. Buyers are responsible for keeping records that match the incoming lot number to outgoing products. This process is continued down the distribution chain. For product exported to the US, the recall regulations are similar.

While HACCP use at the processing level is a major step towards a science-based inspection system, food safety and quality assurance starts with the producer. A successful On-Farm Food Safety (OFFS) program requires each farmer to identify, evaluate, control and/or prevent farm food safety hazards. The industry has made considerable effort to ensure product safety (e.g., through the codes of practice developed by the BCSFA and the BC Shellfish Growers Association).

Development of an on-farm food safety program is important to securing export markets.

CAIA is currently trying to develop a national HACCP-based OFFS for aquaculture products in Canada. Successful implementation of such a program will be increasingly important, as export markets (e.g., the EU) begin to stipulate that farms have HACCP plans in place.

Feed Supplier Quality Assurance (SQA) programs are at various stages of development in the province. An integrated salmon grower and feed manufacturer allows for traceability of feed source from origin to processed product.

Shellfish Safety

The Canadian Shellfish Sanitation Program works to protect consumer health.

The development of the shellfish farming industry depends heavily on effective sanitary and biotoxin monitoring programs to ensure product safety and protect human health. The Canadian Shellfish Sanitation Program (CSSP) is a joint program of DFO, CFIA, and Environment Canada designed to reduce the risk of consumer illness due to contaminated or poor quality shellfish. Environment Canada is the lead agency with regard to monitoring water quality and conducting sanitary and bacteriological surveys. CFIA is responsible for regulating shellfish processing operations including marketing and trade. The main role of DFO is to enforce compliance with CSSP regulations.

CSSP meets the standards and criteria established by the USFDA's National Shellfish Sanitation Program, so that Canada is approved to export live shellfish to the US. The only other countries that are able to do so are New Zealand, Korea, Mexico, and Chile.

CFIA runs a biotoxin surveillance program.

CFIA is also responsible for managing the program to monitor marine biotoxins, a group of naturally produced toxic chemicals that can sometimes accumulate in shellfish. Most biotoxins are produced by microscopic marine algae, such as phytoplankton, which are ingested by filter-feeding shellfish. To reduce the risk of illness from consuming affected shellfish, CFIA coordinates a biotoxin surveillance program. Mussels are deployed at sampling stations in harvesting areas and collected periodically to test for the presence of biotoxins.

Mussels, which accumulate biotoxins more quickly than other shellfish species, are used to detect contamination before biotoxins accumulate in oysters and clams. If shellfish exceed the limits of toxin sampling, DFO closes the area. The closure continues until biotoxin levels in mussels fall below specified limits and the shellfish have had enough time to be flushed naturally. Throughout the closure, the contaminated area is patrolled and closure signs are posted as a warning.

Monitoring water quality for fecal contamination (sanitary survey) is a critical issue as urbanization continues to impact water quality. By 2000, there were approximately 105,000 hectares closed to shellfish harvesting in BC, an increase of two-thirds over the area closed in 1976. Scientific improvements in detecting bacterial pollution sources hold the promise of refining the number, size and duration of closures, and identifying ways to deal with affected marine waters.

Phytoplankton monitoring is being used and required for imported shellfish in other countries.

Although phytoplankton monitoring can provide early warning and mitigate some of the negative impacts of harmful algae blooms, it is not presently in use in BC. Quebec, PEI, Maine, California, New Zealand, and the EU use this monitoring, and it is becoming a growing requirement for shellfish imports into many countries. Other advanced detection techniques are being tested, including a combination of satellite imagery, remote sensing, and stakeholder involvement to track harmful blooms.

Water quality and biotoxin monitoring exclude BC's North Coast.

Current water quality and biotoxin monitoring programs do not cover the entire BC coast, thereby limiting shellfish expansion to areas of testing coverage (see Case Study 7). Industry and government agree that methods and delivery of water quality monitoring can be significantly improved, so as to minimize the frequency and duration of harvest closures while ensuring public safety.

Attempts are being made to directly test product with rapid detection kits but development is slow, and acceptance by regulatory authorities is problematic.

Traceability

Tracking product safety for aquaculture is improving.

Product traceability and related record keeping are essential elements of quality management systems such as CFIA's QMP. Currently, traceability in BC is assured from the hatchery phase for farmed salmon but only from the processing stage for farmed shellfish. CAIA has recently initiated development of a HACCP-based on farm food safety program for all aquaculture in Canada.

Larger companies use software for tracking fish populations.

Larger, vertically integrated companies rely on in-house or third party software, such as Superior® or Farm Control®, to track fish populations through the production cycle. These systems are capable of tracking fish groups from tank-to-tank movements in the hatchery through the marine phase, where fish are likely to be moved pen-to-pen or site-to-site at least once during the lifecycle. The systems also track fish populations with veterinary prescribed withdrawal times, so that the withdrawal period is flagged. Smaller producers use less integrated systems or handwritten records.

Full traceability is becoming a market requirement.

Given the concern of most consumers about the quality and safety of their food, full traceability of aquaculture products could be a marketing tool. However, traceability is becoming a necessity as important markets for BC aquaculture products are increasingly demanding assurances of product safety and quality such as full traceability programs.

6.6.4 Production

Kudoa

Kudoa infections are another major health concern for BC farmed salmon.

Kudoa (*Kudoa thyrsites*) is a parasite that infects a variety of species including Pacific salmon, Atlantic salmon, Pacific hake, and Pacific halibut. The infection attacks the muscle tissue of the fish host and results in soft tissue which reduces their market acceptance. Prevention and control of the parasite is difficult because methods of transmission are not yet conclusive. Kudoa does not pose any risk to human health.

Detecting Kudoa prior to harvest is difficult as live fish do not manifest visible symptoms. Therefore, most infections are not detected until processing. To improve detection during processing, researchers are now developing a test to indicate intensity of infection. Kudoa remains one of the primary production concerns in BC for the farmed salmon industry. In April 2002, the Minister of Fisheries and Oceans approved a $215,400 project to study risk factors associated with Kudoa.

Production Monitoring

Under the Aquaculture Regulation Schedule of the provincial *Fisheries Act*, each aquaculture operation or site must be licensed. A condition of the licence is the annual reporting of harvest quantity and value by species on the Annual Aquaculture Statistical Report (ASAR). Another condition is a maximum production level for the site.

Case Study 7: North Coast Water Quality and Biotoxin Program Society

Issue

Water quality testing, under the Canadian Shellfish Sanitation Program, is a basic food safety requirement for the commercial harvesting and sale of shellfish. However, in 1964 the federal government curtailed biotoxin monitoring on BC's North Coast, creating a huge barrier to aquaculture development. The lack of monitoring has also jeopardized the health and safety of many First Nations residents who, while guaranteed access to shellfish for food, social and ceremonial purposes, are officially prohibited by DFO from harvesting due to the lack of biotoxin monitoring. More generally, a 40-year closure of one-third of BC's coastline for most shellfish activity has affected recreational harvesting, First Nation traditional harvesting, and the potential for shellfish farming alike.

Response

The North Coast Water Quality and Biotoxin Program, based in Prince Rupert, began as a community-driven pilot project in 1998. Its goals were to re-establish an official biotoxin sampling and testing program for the region, and to facilitate commercial shellfish aquaculture development. Participants in the non-profit NGO include local First Nations and non-First Nations communities, shellfish farmers, scientists, economic development groups, and local, provincial and federal governments.

Biotoxin sampling occurs weekly from May 1 through October 31, and every two weeks form November 1 through April 30. At present, there are 22 Biotoxin Monitoring Stations and four affiliated stations in Nisga'a Territory, with proposals for three additional stations. Three biotoxins are monitored: Paralytic Shellfish Poisoning (Red Tide), Amnesiac Shellfish Poisoning (Domoic acid), and Diarrhetic Shellfish Poisoning.

Results

In June 2001, Environment Canada conducted shoreline surveys and faecal coliform testing in Hartley Bay, Kitkatla, Humpback Bay, Metlakatla, and Lax Kw'alaams. The Department's water and biotoxin testing requirements, and those of CFIA, have been met. The program is currently working with DFO to enable areas of the North Coast to be officially opened, based on monitoring results, for First Nations traditional shellfish harvesting.

Lessons Learned

The North Coast Water Quality and Biotoxin Program is a unique, cooperative venture between industry, government, First Nations and local community members. With limited funding, this grassroots organization has met a series of challenges to find a viable mechanism for water quality testing on the North Coast. The use of volunteer labour and creative funding sources, such as the Canadian Rural Partnership, helped establish the program. The development of local laboratory capacity (Northern Laboratories Ltd. and Ocean Ecology) was also essential given the remoteness of communities and the time constraints involved in testing. In addition, the program has garnered community support for the importance of water quality testing, as well as the significant economic opportunities that shellfish aquaculture can provide.

However, the Program has been operating with "soft" money provided by a variety of groups. The Program is in jeopardy as of April 1, 2004. Three years of funding have been secured from DFO for administration – an equal amount is needed for sample collection and transport until there is sufficient harvesting and aquaculture activities to support the program. A valuable northern program may be lost without additional funding.

6.7 *Industry Liaison and Relationships*

6.7.1 Industry Associations

The two primary aquaculture industry associations in the province are the BC Salmon Farmers Association and the BC Shellfish Growers Association.

BC Salmon Farmers Association (BCSFA)

This 30-year-old association serves as a forum for communication, a lobbying vehicle, a point of contact for stakeholders and the public, and a focal point for industry-wide initiatives (e.g., development of the 2001 Code of Practice). All salmon farming operators in BC are members. The Ahousaht First Nation recently joined as the first aboriginal member. BCSFA membership includes service and supply companies as well as farmed salmon producers.

BC Shellfish Growers Association (BCSGA)

Originally formed as the BC Oyster Growers Association, BCSGA has been the voice of the shellfish industry since 1948. Over the years the association has changed and evolved to reflect diversification of the industry. The BCSGA is non-profit and represents the majority of shellfish growers in the province in addition to industry suppliers and service providers. The priorities of the association are to build effective support structures and relationships among stakeholders, to advocate for a secure business climate that will promote better investment and profits, to support scientific research and technological development, and to increase the growth and diversity of opportunity for the industry.

Aboriginal Aquaculture Association of British Columbia (AAABC)

Recently formed, AAABC considers aquaculture a promising economic development opportunity for First Nations. The association brings together First Nations, industry and government representatives to exchange information, network, and provide support. It aims to inform and educate First Nations, coordinate monitoring programs for salmon farms, and foster strategic alliances with the aquaculture industry.

Society for the Positive Awareness of Aquaculture (SPAA)

SPAA is a BC non-profit organization composed of industry and community interests whose mission is to disseminate accurate information on the aquaculture industry and its products. The Society held an Aquaculture Awareness Day festival in Campbell River in May 2003.

6.7.2 Integration and Strategic Alliances

Cooperation and alliances are common in salmon farming.

BC industry associations also belong to national associations, most notably the Canadian Aquaculture Industry Alliance (CAIA). CAIA represents the interests of Canadian aquaculture operations, feed companies and suppliers, as well as provincial finfish and shellfish aquaculture associations. Its activities include image building, education, advocacy, coalition building, national integration, and membership services. CAIA, in conjunction with Human Resources Development Canada and others, has launched an initiative to identify and meet the industry's human resource needs.

Most BC salmon farming operations are part of international food production companies with processing, marketing and distribution arms in North America and around the world (e.g., Norway, Chile, Continental Europe). Some have European parents that are diversified into other farmed finfish, such as cod, halibut, or sea bream, as well as chicken and other protein sources. This vertical integration and the broad scope of parent operations give the BC industry knowledge about protein value chain issues throughout the world.

Salmon of the Americas

To maintain and grow US markets for farmed salmon, industry realized the need to respond to market challenges, especially increasing pressure from environmental groups. Salmon producer associations in the US, Canada and Chile recently signed an agreement called Salmon of the Americas (SOTA) to promote farmed salmon as a top quality, nutritious product and demonstrate that salmon farming is environmentally sustainable. BCSFA is a signatory. This is the first time in the history of salmon farming that fierce international competitors have been able to put aside their differences and see the benefit of collaboration to achieve common objectives.

The shellfish industry remains fragmented.

In contrast, the perspectives and strategic alliances of the BC farmed shellfish sector are narrower and much less expansive. In particular, relationships between growers and processors are fragmented and no strong marketing organization or agent exists for the many small producers. The success of the New Zealand mussel culture industry is largely attributable to its coordinated marketing (see Case Study 8).

6.7.3 Public Perception

The public has mixed views about salmon farming.

The Canadian public has mixed emotions about salmon farming, and aquaculture in general. On the one hand, farmed salmon is a staple of the restaurant menu and the retail seafood counter alike. BCSFA and its member companies have contributed to a variety of community events (e.g., the Van Isle 360 yacht race, Port Alice cancer fundraiser), and have generated considerable local good will. In addition, BCSFA has hosted researchers, financial institutions, media, grocers, and capture fishery interests on farm and processing plant tours.

On the other hand, the industry has been under attack, mainly by environmental groups, with respect to its impact on the environment (e.g., wild fish), human health issues (e.g., from carotenoid use), and the economy (e.g., wild fish markets). As discussed earlier, many of these issues are spurious or misrepresented. Others require scientific research that is already underway with the support and cooperation of aquaculturists.

This divided public perception is reflected by the results of an August 2003 Ipsos Reid poll sponsored by BCSFA. People were asked the question: "Based on what you know about salmon farming, do you support or oppose salmon farming in BC?" In response, 45% indicated that they strongly or somewhat supported the industry, 46% were strongly or somewhat opposed, and 9% were undecided.

Case Study 8: The New Zealand Mussel Industry Council

New Zealand mussel production provides an example of an industry that has worked cooperatively on many fronts to achieve sustained viability. Part of the industry's cohesive nature can be attributed to the fact that, while oysters, clams and abalone are farmed in New Zealand, most production has been focused on the Greenlip mussel (*Perna canaliculus*), which is marketed under the registered name Greenshell® mussel (see www.greenshell.com). Therefore, all industry innovations, technological improvements and marketing advancements benefit the industry as a whole.

Another reason behind New Zealand's success is the strong leadership of its Mussel Industry Council in helping the industry work together toward common goals. The Council has been instrumental in spearheading activities around product safety and quality, such that today the extensive monitoring of growing waters for faecal contamination and biotoxins is largely industry-led and funded. The Council has also been a world leader in the development of environmental management systems. In fact, its Executive Director has provided guidance to other shellfish farming countries, including Canada and the US, in preparing industry codes of practice.

Strong leadership and cooperation have resulted in significant industry expansion. From its small beginnings in the 1970s, the New Zealand mussel industry has grown to a total annual production of around 75,000 tonnes. At present, there are 605 mussel farms encompassing 2,850 hectares, yielding an export return greater than $Cdn 43,000 per hectare wholesale value. In comparison, the BC shellfish farming industry currently has 482 farms on 2,114 hectares averaging a return of approximately $14,000 per hectare wholesale value (with farmgate value about half this amount).

A recent Pacific Fisheries Resource Conservation Council (PFRCC) report acknowledged: 1) the divisiveness of public debate and lack of constructive dialogue and solutions on salmon aquaculture, and 2) the need to convene a Salmon Aquaculture Forum to advise governments and inform the public on what is required to achieve an environmentally appropriate, socially beneficial, and economically viable salmon aquaculture industry (PFRCC December 2003).

Shellfish aquaculture has also been the subject of controversy.

Shellfish farming is not immune from public controversy. For example, a key issue in the 2002 North Island Straits coastal planning process were the conflicts with viewscapes and upland property owners arising from shellfish tenure expansion around Denman Island.

To a large extent, these controversies and mixed public opinion reflect the newness of the industry. The public image of salmon farming can profoundly affect industry performance through government policy and other influences. For example, industry reports that public perceptions inhibit their local recruitment efforts and contributes to worker turnover.

An updated, credible economic analysis is needed to help inform public opinion.

A major deficiency of BC finfish and shellfish aquaculture sectors is the lack of a current, credible analysis of economic costs and benefits, particularly to coastal communities and First Nations, from industry development and operation. The last formal economic reporting for the BC farmed salmon industry occurred for 1993 (see ARA, 1994). This kind of analysis would allow the public and stakeholder groups to assess any environmental concerns against the economic development benefits.

The New Brunswick salmon farming industry, a much smaller industry than its BC counterpart, has sponsored just such an analysis twice over the past five years, and modelled the analysis on the 10-year-old BC report (Doane Raymond and ARA 1998; Stewart 2001). The industry received funding from the Atlantic Canada Opportunities Agency (ACOA) to sponsor the analysis.

7.0 BC SEAFOOD PROCESSING

Processing involves the transformation, packaging, transportation, and distribution of harvested and farmed seafood. In 2002, there were about 220 licensed fish processing plants in BC of which 182 were active operations.

This section builds on the seafood processing profile of Section 2.4 and describes the business environment of the BC seafood processing industry, recent trends, business challenges, and emerging opportunities. In so doing, the study compares and constrasts the BC seafood processing sector with other seafood processing sectors in the world, most notably Alaska, and with other protein producers and distributors.

7.1 *Markets*

In 2002, the BC seafood processing sector had estimated revenues of $1,147 million from sales of a variety of canned, roe, surimi, fresh, frozen, and other products such as smoked, fillets, portions, and fishmeal.

7.1.1 BC is a Small Player

BC seafood production is very small on a world scale.

British Columbia comprises a very small share of world seafood production, both at the primary harvest or growing stage and at the processed stage. Total BC seafood primary production is 0.3 million tonnes or only 0.2% of the 140+ million tonnes of total world production from capture and aquaculture sources.

	2001 Production		
	BC ('000s tonnes)	World ('000s tonnes)	BC Share (%)
Salmon			
Capture	23	844	2.7%
Aquaculture	68	1,200	5.7%
Herring			
Pacific	23	407	5.7%
Other	0	2.549	0.0%
Flatfish			
Pacific Halibut	5	40	12.5%
Other, e.g., soles	14	934	1.5%
Cod, Hakes, Haddocks			
Sablefish	3	23	13.0%
Pacific Cod	1	331	0.3%
Pollock	2	3,136	0.1%
Other	80	5,758	1.4%
Shellfish			
Geoducks	2	4	50.0 %
Shrimps & Prawns	5	4,222	0.1 %
Oysters	7	4,607	0.2 %
Clams, Cockles, etc.	3	3,918	0.1%

Exhibit 23: World Salmon Production and Consumption 2001

2001 World Salmon Production ('000s tonnes)[1,3]

	Wild				Farmed			
	BC	US	Other	Total	BC	Other	Total	Total
Chinook	1	7	1	9	8	15	23	32
Sockeye	6	79	25	110	0	0	0	110
Coho	0	19	3	22	2	149	151	173
Pink	11	195	177	383	0	0	0	383
Chum	5	66	249	320	0	0	0	320
Atlantic	0	0	0	0	58	967	1,026	1,026
Total	23	366	455	844	68	1,132	1,200	2,044

2001 World Salmon Consumption ('000 tonnes)[2,4]

		Wild	Farmed	Total
Fresh & Frozen	- US	38	174	212
	- European Union	24	431	455
	- Japan	248	140	288
Canned		118	3	121
Other		158	282	440
	Total	586	1,030	1,616

Note:

1. *production is round weight*
2. *consumption is processed weight*
3. *production excludes 192,000 tonnes of farmed rainbow trout raised in saltwater pens (so-called "salmon trout")*
4. *consumption excludes 144,000 tonnes of salmon trout – 114,000 tonnes fresh and frozen (2,000 tonnes US, 6,000 tonnes EU, 106,000 tonnes Japan), and 30,000 tonnes other (19,000 tonnes EU, 11,000 tonnes other).*

Source: Estimates by Gunnar Knapp, ISER University of Alaska, Anchorage based on FAO data.

Total BC seafood exports are about $US 0.6 billion or 1% of the $US 60+ billion in annual seafood trade around the world. Exhibit 23 illustrates the small BC share of the world markets for salmon, a signature seafood product from the province. Alaska capture production is more than five times greater than BC production of salmon, halibut, sablefish, and groundfish (including more than 1 million tonnes of pollock).

For certain species – e.g., Pacific halibut, sablefish, geoduck – BC produces 10% or more of world supply. But generally, BC has only a marginal presence in the world seafood market. Even a 10% market share confers little market power or influence to BC producers

7.1.2 Continued Expansion of Seafood Production and Demand

Increases in world seafood production will come from aquaculture.

World seafood production is projected to grow with almost all of this growth derived from aquaculture as most of the world's wild fish stocks are fully exploited or overexploited.

World Seafood Production Will Continue To Expand

A model of food supply and demand to the year 2020 projects the following:

- global production of food fish will expand by 1.5% annually with almost all of the additional production coming from aquaculture
- real fish prices will rise by 4 to 16% by 2020 with the largest price increases experienced for high valued finfish and crustaceans
- prices for meat (poultry, beef, pork, sheep meat) and eggs will decline by about 3% in real terms
- the rate of technological change for the conversion efficiency of fishmeal and oil to protein in aquaculture is a key determinant of both seafood production levels and prices in the future.

Source: Christopher Delgado et al. "Fish as Food: Projections to 2020", Paper Presented to IIFET conference, Auckland, New Zealand 2003.

Aquaculture production, akin to poultry and other farmed products, can increase or expand to meet world demand for food. Technological innovations such as improved breeding and lower feed conversion ratios can lower costs of production and reduce prices and increase consumer demand. For example, US per capita consumption of poultry has doubled over the past 30 years primarily because of these types of technical innovations.

Consumer tastes are changing.

As discussed in Section 3, overall demand for seafood will grow and be shaped by a variety of consumer tastes and preferences:

- preference for more healthy, wholesome foods (and seafood is an excellent sources of omega-3 oils that reduce the risk of heart disease);
- convenience and ease of preparation;
- greater trend to eating out and growth of food service relative to retail;
- evolving, increasing global conservation ethic with consumers making food choices based not only on price and quality issues but also on sustainability, animal welfare, "naturalness", celebrity chef endorsements, ecological footprint, and other issues;
- increased preference for fresh and live fish and decreased demand for breaded and battered fish.

Exhibit 24: Wholesale Value of BC Seafood Products by Product Form 2002

	Wholesale Value ($ millions)							
	Canned	Roe	Surimi	Fresh Whole	Frozen Whole	Live	Other*	Total
Capture								
Salmon	62	18	0	29	54	0	36	199
Herring	0	121	0	0	2	0	5	128
Other Finfish	0	0	28	64	45	3	112	252
Shellfish	0	18	0	4	27	105	26	180
Subtotal	62	157	28	97	128	108	179	759
Aquaculture								
Salmon	<1	3	0	242	13	0	101	359
Herring	0	0	0	0	0	0	0	0
Other Finfish	0	0	0	<1	0	0	0	<1
Shellfish	0	0	0	0	<1	22	7	29
Subtotal	<1	3	0	242	13	22	108	388
Total Seafood								
Salmon	62	21	0	271	67	0	137	558
Herring	0	121	0	0	2	0	5	128
Other Finfish	0	0	28	64	45	3	112	252
Shellfish	0	18	0	4	27	127	33	209
Total	**62**	**160**	**28**	**339**	**141**	**130**	**287**	**1,147**

** Fillets, portions, smoked, cooked, peeled meat, fishmeal, etc.*

Source: MAFF

Traceability is increasingly important.

In addition, world seafood production, demand, and trade will be influenced by the necessity for increased traceability in food shipments from the producer to the consumer. Globalization is resulting in the shift of labour–intensive seafood processing to low wage countries in southeast Asia. Seafood demand is also affected by population growth, incomes, and other socio-economic factors.

7.1.3 Domestic and Export Markets

The majority of BC seafood is exported from Canada. Exhibit 24 presents the product mix of BC seafood for 2002.

Geographic Distribution of Sales

The approximate geographic distribution of BC processed seafood product sales is:

	Capture	Aquaculture
BC	10%	10%
Rest of Canada	15%	5%
Outside Canada	75%	85%

Most BC seafood is exported, mainly to the US.

There is wide variation among species and products. For example, traditionally about half of canned salmon is sold in Canada but the majority of frozen whole salmon is exported. Over 95% of herring roe and herring spawn-on-kelp is exported to Japan. Several specialty shellfish products such as live geoduck, sea urchin roe, and frozen whole prawns are sold to Japan, Hong Kong, and other Southeast Asian countries.

The US is the major market for farmed salmon, both whole fish and fillets and portions, and groundfish fillets such as soles and rockfish. The Canadian market for BC farmed salmon is restricted to Western Canada as New Brunswick producers, because of transportation cost advantages, serve central and eastern Canada.

Other traditional export markets have become less important.

As noted in Section 2.4.3, the overall export market is increasingly dominated by the United States, presently with over 60% of total export value. Traditional markets in Japan and Europe have declined in importance. Export market share to these regions has fallen mainly due to increased competition from farmed salmon worldwide (Chilean imports to Japan, Norwegian and UK imports to Europe).

Market Cooperation in the Value Chain

Cooperation through the value chain helps to meet market demand.

Cooperation in the seafood value chain does exist for several capture fisheries segments, mainly IQ fisheries, in matching supplies to market demand. For example, groundfish processors will coordinate with vessel operators as to scheduling deliveries and suggested maximum trip length to ensure quality. These same processors will coordinate with California buyers to ensure product deliveries to San Francisco and Los Angeles, for example, in time for weekend sales.

In addition, herring processing plants have had Japanese technicians to ensure the product grading meets markets needs and standards. Herring fisheries are timed to maximize the roe content of the fish.

The capture salmon seafood sector is less able than other capture seafood sectors to meet market needs because under present harvest management practice, it has extreme difficulty in producing the consistent supplies, quality, and price of products to meet customer specifications.

The BC farmed salmon sector sees more value chain cooperation than the farmed shellfish sector.

The BC farmed salmon industry is characterized by significant value chain cooperation. Part of this reflects the vertical integration of growout, processing, and marketing functions for several companies. More important, though, is the practice of harvesting and processing fish to meet customer orders. In essence, producers are able to keep farm inventory in the water. The industry will also offer specialized processing or cuts to meet the needs of specific customers, e.g., a "Costco cut" fillet which has much of the belly flap removed.

As noted in Section 6, there is much less cooperation in the farmed shellfish value chain, mainly due to the small size and fragmented nature of producers.

Increased Role of Trading

Buying and sellng already processed seafood, so-called "trading", is an increasing share of the BC seafood business for several companies such as Ocean Fisheries and Calkins and Burke. (Some of the processed product is imported from Southeast Asian countries such as Thailand.)

7.1.4 Generic Seafood Marketing

BC Seafood Marketing

Limited funds are available for generic marketing of BC seafood.

Commercial salmon fishermen in BC are levied 0.5% of landed value to fund generic marketing activities by the provincial BC Salmon Marketing Council (BCSMC). The Council was established under the Farming and Fishing Industry Development Act in 1991. At one time, the Council had significant extra monies from outside sources, for example, a five year agreement with Western Economic Diversification (WED) for $3.3 million in matching funds for export and quality improvement programs. The lapsing of these agreements combined with the approximately 75% decline in salmon landed value since the mid-1990s has forced the BCSMC to greatly reduce its scale of operation.

No other BC seafood industry sector has a levy for generic marketing. The Province of BC has sponsored an investigation of the merits of a broad-based generic marketing organization for all seafood in BC (Salmon and Nelson, 2003).

Under the Canadian Agriculture and Food International (CAFI) program, Agriculture and Agri-Food Canada has provided some funds for five-year generic export marketing initiatives for specific products such as herring roe and herring spawn-on-kelp, geoducks, sardines, and wild salmon. (The program requires industry to match funds.)

Alaska Seafood Marketing

Other global seafood producers have more marketing funds.

In Alaska, levies of 1% of salmon ex-vessel value and 0.3% of the value of all seafood species are used to fund the seafood marketing activities of the Alaska Seafood Marketing Institute (ASMI) both in the US and abroad. ASMI also has attracted substantial federal grants in recent years to fund its activities. The federal US Department of Agriculture has also helped the Alaskan industry through purchasing large quantities of canned pink salmon for institutional markets.

Nevertheless, even the Alaskan marketing dollars, which are many times larger than BCSMC funding, are still significantly less than marketing funds by the Norwegian farmed salmon industry and other global seafood producing nations.

7.1.5 Prices Received

Market prices determine prices to harvesters and growers.

Prices received for BC processed seafood, so-called "wholesale prices", depend on the expected value of these products in the marketplace. Wholesale prices to BC seafood processors in turn affect prices paid to harvesters and growers for raw fish and shellfish material.

The interrelationships among prices at different elements of the value chain are illustrated by Exhibit 25, where the price patterns in Tokyo wholesale markets, to the Alaskan processor, and to the Alaskan fishermen for sockeye mirror one another. The implication is that if value and prices to seafood consumers can be increased, then processors and fishermen would see financial benefits. Exhibit 26 displays BC wholesale prices for selected seafood products from 1982 to 2002.

Salmon

Increased salmon production has resulted in price declines since the 1980s.

Wholesale prices for all capture salmon products – canned, frozen, fresh, smoked, etc. – have decreased significantly since the 1980s. The major reason is the growth of both farmed and capture salmon production (see Exhibit 10, Chapter 3). Total world production of salmon at over 2 million tonnes today is more than triple what it was 20 years ago.

Japan used to be a premium market for frozen whole salmon and set a benchmark price for Canadian sockeye, but farmed salmon, specifically Chilean coho, has made significant inroads. The poor Japanese economy also has affected the price of all salmon imports. As a result of the decline in the Japanese market, both BC and Alaskan producers have been putting larger shares of their sockeye raw material into the can with resulting downward pressure on canned sockeye prices.

Markets for canned salmon, especially pinks, is glutted and prices have decreased.

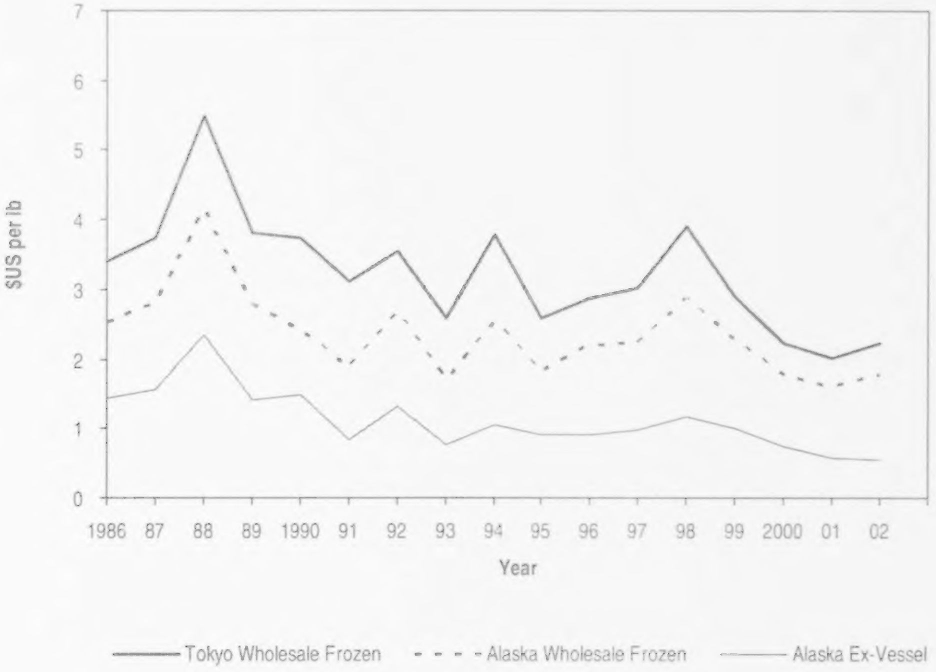
The canned market for pink salmon is very weak. Alaska has produced very large volumes of canned pinks in recent years thereby depressing prices. From the mid-1980s to the mid-1990s, BC seafood processors purchased increasing amounts of Alaskan salmon, mainly pinks, to supply their canning lines. But, in view of the depressed canned salmon market, these same producers have recently curtailed these purchases.

The price of canned pinks in 2002 of $3.60 per kg product weight ($78 per 48 lb case) was one-third less than in 1982, without taking inflation into account. And, since canned pinks are a commodity priced in US dollars, prices fell even further in 2003 as the Canadian dollar rose in value.

Previously frozen and farmed salmon are showing up as canned product.

Southeast Asia is producing increasing amounts of canned salmon from previously-frozen salmon. This canned fish sells at a discount compared to cans produced from fresh salmon such as BC produces, but the availability of canned previously-frozen fish drags down the prices and markets for all canned salmon.

Exhibit 25: Alaska Sockeye Salmon Prices



Source: Gunnar Knapp, "Change, Challenges and Opportunities for Wild Fisheries", Presentation to Conference on Marine Aquaculture, Seattle November 2003.

Thailand and other Asian countries are also producing innovative flavoured canned salmon and tuna products. These products are making inroads into Australian and other markets. Recently Chile has started to can farmed salmon. This product compares favourably on price and quality and/or taste with canned pinks from North America. BC producers have been at the forefront in producing skinless, boneless, canned sockeye, a quality niche product that has been well-received in the UK and elsewhere.

Traditionally much of the BC chinook, coho, and chum caught by fishermen was sold as frozen whole fish to Europe for smoking and other value-added products. This market was lost due to the influx of farmed Atlantic salmon from Norway and the United Kingdom, salmon which was perceived to have advantages in consistent supply, quality, and price. However, BC producers report that there is increasing interest in BC wild salmon in Europe over the past year.

Farmed salmon, once a niche product, has become commonplace.

Farmed salmon started as a high priced novel food product serving niche markets. Today, it is a mass market protein. The BC industry in response has been shifting production from whole dressed fish to value-added fillets and portions. Nevertheless, large production increases from Norway and Chile since the year 2000 caused prices in 2002 to be about 30-40% lower than in the late 1990s.

Herring

The herring market in Japan has changed because of consumer preferences and a weak economy.

The herring roe market in Japan has been transformed over the past decade with the decline of the high value year-end gift pack market and the growth of the (cheaper) flavoured or marinated roe market (Johnson and Knapp, 2000). The flavoured product can be produced from lower quality material, such as that from Atlantic herring, but the flavoured market is year-round, growing (especially with young consumers), and more price stable. The Japanese market has also been affected by the influx of low priced herring roe from Russia in recent years. Canadian herring roe sells at a premium over Alaskan herring roe due to better quality that derives in part from the fisheries management system in BC.

BC spawn-on-kelp is also well-recognized in Japan for its quality, but has experienced significant price declines recently. These declines reflect both changes in the Japanese economy and consumer tastes as well as production increases (Edwin Blewett & Associates Inc., 2002).

Groundfish

The groundfish market is relatively strong.

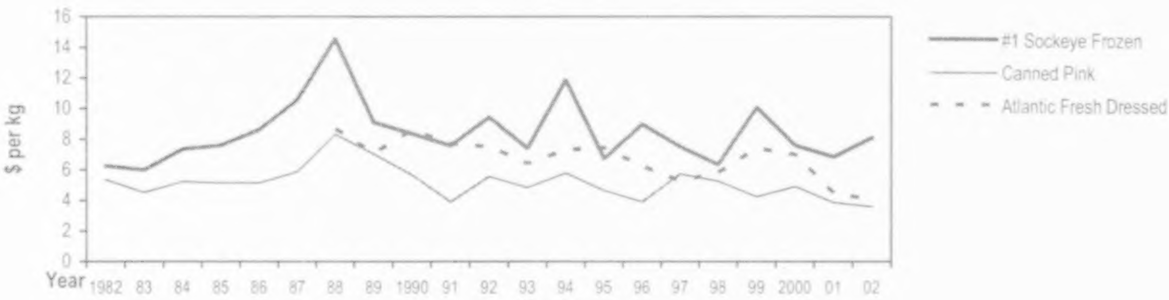
The majority of BC soles, rockfish, and Pacific cod are sold as fillets in the Pacific Northwest from BC south to California. The fillet market has been affected by three main developments over the past decade:

- the 1997 IQ groundfish trawl fisheries management program in BC has improved fish quality, allowed processors to schedule deliveries to meet market needs, and directed more fish to the premium fresh market and less to the lower priced frozen market;
- the decline of the Atlantic cod stocks that increased demand for other 'whitefish' seafood products world wide; and
- the weakening of the Canadian dollar against the US dollar that, until this year, increased prices to Canadian exporters for sales denominated in US currency.

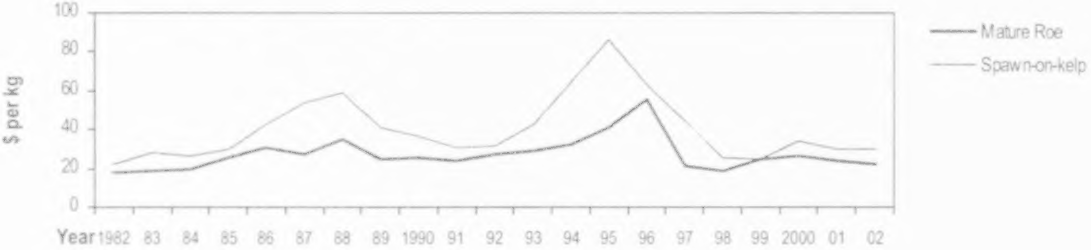
As a result, the price of many groundfish fillet products such as rockfish doubled during the 1990s. The strengthening of the Canadian dollar in 2003 has put downward pressure on prices.

Exhibit 26: BC Wholesale Prices for Selected Seafood Products

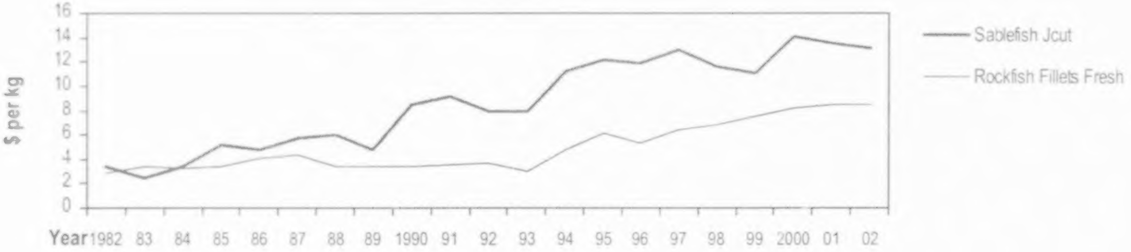
Salmon



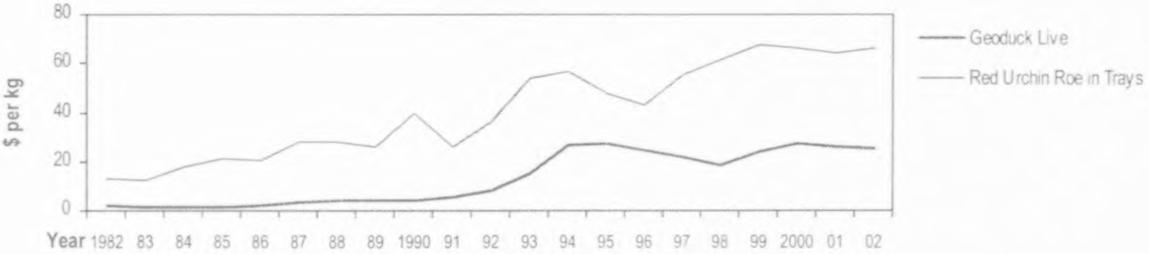
Herring



Groundfish



Shellfish



IQ fisheries have helped to improve product quality and prices.

Sablefish is a specialty product, most of which is exported to Japan as frozen whole head-off Japanese ("J") cut fish. The price increased steadily through the 1990s after the introduction of the IQ system in 1990. Halibut prices have also increased under the 1991 IQ fisheries management program. Better quality fish delivered over a much longer fishing season has facilitated development of the fresh market.

But, the market for surimi is weak.

Surimi markets worldwide have been hit by a glut of production and resulting soft prices. Consequently, processors including those in BC have been shifting to frozen fillet production from hake. A contributing factor to the price decline has been repercussions from the BSE incidents around the world as many surimi producers use a beef plasma in processing.

A limited but growing market exists for live rockfish, soles, halibut, and other groundfish, a market that pays a significant price premium over traditional dead whole fish.

Shellfish

Prices for geoduck, red sea urchin roe, prawns, and live clams and oysters have increased.

Shellfish prices have been increasing. Geoduck prices have increased ten fold over the past 20 years due to the development of the live market in Hong Kong. Red sea urchin roe has also experienced substantial price increases. However, the negative impact of SARS on prices for BC shellfish sold to Hong Kong and China in 2003 may persist for some time.

Prawn prices have increased due to the development of the frozen whole market in Japan and the live market in the Pacific Northwest. However, prices to BC shrimp processors are depressed due to world oversupply.

Markets for live clams, both wild and farmed, and live farmed oysters appear strong and growing. In particular, many west coast buyers refuse to buy Gulf of Mexico and other southern oysters during the hot summer markets and instead choose BC oysters. Markets for BC shucked oyster meat are flat and the product faces substantial competition from Washington State, a much larger producing region.

7.1.6 Product Quality, Differentiation, and Branding

Product quality from the consumer's perspective has many different attributes or dimensions (Exhibit 27). Quality is a different attribute than food safety.

BC Generally Has a Good Quality Reputation

BC's reputation for quality is good but inconsistency can be a problem.

Overall, BC seafood products have a good quality reputation. The reputation was established 20 plus years ago when finfish aquaculture was still in its infancy worldwide, at a time when Alaska was experiencing severe quality problems, and when many nations' seafood inspection programs were inadequate. Since then, the quality of Alaskan seafood has greatly improved, the quality of so-called "twice-frozen" product has also improved, and food inspection programs around the world have become more stringent. BC still has a quality advantage but the quality gap between BC and its competitors has shrunk. In a real sense, our quality reputation reflects past practices and circumstances.

Some buyers of BC capture seafood note the inconsistent quality of some BC salmon, halibut, and groundfish. The latter two fisheries operate under IQ fisheries management but there is still potential to improve quality through some combination of shorter trips, better on-board handling and icing techniques, and more bleeding of fish onboard.

Exhibit 27: Non-Price Attributes of Seafood

Nutrition

- fat & calories
- protein
- omega 3 oils
- sodium, vitamins, minerals

Value

- appearance & texture
- taste
- colour
- odour
- product form
  - bones in/out
  - skin on/off
  - head on/off
  - ease of preparation
  - "ready to eat", "ready to cook"
- size
- purity
- composition integrity & flavourings
- shelflife

Packaging

- materials
- labels e.g., best before date
- other information e.g., recipes

Food Safety

- foodborne pathogens
- heavy metals, chemicals
- food additives
- toxins, e.g., PSP
- additives

Process

- sustainability
- traceability
- ecolabelling
- animal welfare
- plant conditions, worker training

Source: Adapted from James L. Anderson "The International Seafood Trade", CRC Press 2003.

Quality Standards Have Risen

The growth of aquaculture has helped to raise quality standards.

The growth of aquaculture has raised quality expectations in the marketplace thus affecting quality perceptions and standards for BC and other seafood. For example, whole BC farmed salmon is delivered live to the processing plant, bled, slaughtered, processed, graded, and boxed into 50 lb styro containers, and loaded into trucks within 3 hours of slaughter. The fresh whole fish then reaches California markets within 2 days.

In many cases, traditional capture harvesting, handling, processing, and transport techniques are perceived as inadequate relative to aquaculture techniques. For this reason, the capture fishery, such as the Chignik salmon seine fishery in Alaska (Case Study 3 in Section 5), is exploring a new fisheries management business model. Again for this reason, several capture fishery segments are adopting individual quotas or some other form of property rights management.

Branding is Limited

Branding requires consistency of supply, quality, and price..

Branding of BC seafood is limited. Canned salmon sold in the domestic market is branded under such labels as "Gold Seal" and Ocean's". Some smoked salmon products are also branded. Stolt Seafarms has its trademarked Sterling brand of farmed Atlantics. BC oysters sold live are branded by producing region such as Fanny Bay, Deep Bay, or Cortes Island.

It is difficult to brand a food product that is not packaged. It is also difficult to brand a product without consistency of supply, quality, and price. This requires strict quality control and grading.

Product Differentiation Quality is Key to Viability

BC is better suited to offering niche seafood products.

With the forces of globalization and improvements in technology, British Columbia is at a severe disadvantage in commodity seafood markets. Commodity seafood markets are international seafood markets that are driven by volume, economies of scale, low production costs, and low prices. This is the production-driven end of the seafood trade.

The other, smaller end of the seafood trade is characterized by high quality, high priced niche seafood products. This market segment is smaller and more regional in nature. It comprises high quality fresh, frozen, live and roe products that command premium prices for premium quality products that meet the needs of particular market segments. This potentially is where the BC seafood advantage lies.

Stiff competition requires new business models and greater cooperation.

At the same time, many seafood nations around the world, given the limited growth potential for capture fishery landings, are attempting to follow this market-driven seafood path. Success will require a new business model and new institutional standards and cooperation so that all elements in the value chain have appropriate quality and price incentives.

7.2 Government Policies and Regulations

Seafood processing falls under provincial jurisdiction.

According to the *Constitution Act* of 1867, provinces have jurisdiction in property and civil rights. Once wild fish and shellfish are caught and landed, they become private property so the buying, processing, and selling of fish therefore falls under the jurisdiction of the Province of British Columbia.

However, under the same act, interprovincial and export trade and food health and safety fall under the jurisdiction of the federal government. Thus, both provincial and federal governments are involved in regulation and licensing of seafood processing and have developed several Memorandum of Understandings (MOUs) to clarify responsibilities.

7.2.1 Licensing

The BC Ministry of Agriculture, Food and Fisheries (MAFF), in cooperation with the federal Department of Fisheries and Oceans (DFO), the Canadian Food Inspection Agency (CFIA), the BC Centre for Disease Control (BCCDC), and the Ministry of Water, Land and Air Protection, licenses all fish processing plants, fish buying stations, fish brokers, and fish vendors. The type of licence required and agencies involved depends on the nature of each specific operation. In BC, the number of licensed fish processing plants, buying stations, and brokers is not limited by regulations.

BC Plant Licensing

All processing plants, buying stations, brokers, and vendors in BC require licences.

A Fish Processing Licence is required by any company or individual processing fish or aquatic plants (fish processing licence costs range from $1,800 for a large cannery to $290 for a non-salmon finfish plant). Processors exporting seafood products outside of BC or processing bivalve shellfish or farmed salmon must also have their processing facility registered with the CFIA. Processors are required to submit to MAFF an Annual Fisheries Production Schedule (AFPS) detailing wholesale product volumes and values for the past calendar year.

A separate Fish Buying Station Licence is required for each vessel, vehicle, or shore station used to receive fish directly from a harvester. The one exception is a fish processing facility with a valid Fish Processing Licence; a separate buying licence is not required for collecting fish at that location provided the Fish Processing Licence includes the category of product being received.

A Fish Broker Licence is required by any person or company purchasing fish directly from the fishermen for resale, or acting as an agent on behalf of another individual or company. The Fish Broker Licence differs from the Fish Buying Station Licence which permits an individual to operate a facility where fish are received directly from the fisher.

Seafood safety falls under the jurisdiction of CFIA.

The Canadian Food Inspection Agency (CFIA) is responsible for seafood safety. Rigid standards exist for product safety, processing plant construction (e.g., cement floors and walls), operating practices, and offal disposal and wastewater treatment. The standards are based on HACCP – Hazard Analysis and Critical Control Point – which identifies potential hazards and critical points during seafood handling and processing. Each federally-registered plant must have a Quality Management Program (QMP) with a QMP officer. In British Columbia, all offal must go to reduction plants or compost and all wastewater must be "fine-screened".

Alaska Plant Licensing

Alaskan processors must also meet licensing and other regulatory requirements.

In Alaska, a fish processor needs three separate licences or permits – a Fisheries Business Licence, a Seafood Processing Permit, and an Intent to Operate Certificate. The Alaska Department of Revenue (ADOR) permit fee for shore-based operations processing more than 2,270 kg or 5,000 lbs per day is $US 1,290. Alaska also levies a Fisheries Business Tax, from 1% to 5% of ex-vessel catch value, paid by the buyer. Processors must provide surety for the Fisheries Business Tax due at the end of the year, by prepaying the estimated amount, providing lienable real property, or purchasing a performance bond.

Waste disposal requirements are less stringent in Alaska.

The Alaska Department of Environmental Conservation (ADEC) provides a seafood processing permit at a cost of $US 25 after receiving and approving a variety of authorizations, e.g., wastewater disposal, US Environmental Protection Agency (USEPA) processing waste disposal, facility plans, etc. Few reduction plants operate in Alaska and processors are often able to obtain USEPA approval to dump ground offal at sea either through a pipe or by using barges. In addition, waste treatment requirements are less onerous in Alaska than in BC and waste water is typically not treated before discharge to the environment.

The ADFG requires processors to identify where they intend to operate and what fish they intend to process. Processors/buyers must acquire code plates and fish tickets to record fish purchase transactions. Processors must also submit a Commercial Operators Annual Report no later than April 1 for the previous year's activity. (The report details purchases and processed volumes and final values by species and form.) There is no charge for fulfilling the Intent to Operate requirements.

7.2.2 Quality Assurance Regulations

BC Quality Regulations

No standardized grading exists for BC seafood products.

There is no standardized grading of BC seafood products by third parties, either government or the private sector. Under the federal *Fish Inspection Act*, Fish Inspection Regulations C.R.C. c802 Section 29.

> *"No person shall mark or label a container of fish with a quality designation or sell a container of fish that is so marked or labelled unless:*
>
> *(a) a standard for that quality has been reflected in these regulations; and*
> *(b) the fish in that container meets that standard."*

Currently there are no quality standards or grades in regulation. The implication is that an individual fish processor or the fish processing industry as a whole cannot make a quality claim on product shipments without a change in federal government regulations and without third party verification that the fish meets the quality claim.

Alaska Quality Regulations

Alaska has a voluntary grading program for salmon.

Similar to BC, Alaska has no regulated third party grading of seafood products. However, the private sector recently launched a voluntary third party grading and certification program for Alaska fresh and frozen salmon. The intent is to ultimately extend the program to other products.

Alaska Quality Seafood – Grading for Quality and Value

Alaska Quality Seafood (AQS) established in 2001 as a non-profit division of the Alaska Manufacturer's Association (AMA) provides training and certification of fishermen, tenders, and processors to improve quality and consistency of Alaskan seafood. Participation in the AQS Program is voluntary and has four principles: 1) adoption of rigid handling practices, 2) openly-known product grades ("premium", "choice", "select", and "standard"), 3) third party verification of procedures, handling, quality, and grading, and 4) a marketing program to communicate the value of the "quality seal". Fish must be bled to have a chance of achieving the premium grade but not all bled fish necessarily will achieve the premium grade.

The program certifies both product and participants. Becoming a AQS Certified Processor normally involves a two to three-year certification process. Certified Processors undergo random audits to verify compliance. The Program provides documentary evidence as to product quality and enhances product traceability, features that provide business benefits in marketing, dispute resolution, and other areas.

7.2.3 Regulation of Seafood Packaging Materials

Canadian Packaging Regulations

The safety of all materials used in packaging foods is controlled under Division 23 of the Food and Drugs Act and Regulations Section B 23.0001 of Health Canada. Companies can submit voluntarily to Health Canada an application for a premarket assessment of the chemical safety of a food packaging material, including gas for modified atmosphere packaging (MAP). The application should provide research and/or documentation that the material or additive is safe and that the material will achieve its intended technical effect.

US Packaging Regulations

Ozone is not approved for use in Canada because no company has applied.

The regulations of the US Food and Drug Administration or USFDA mirror those in Canada. In 2001 the USFDA approved the use of ozone as an antimicrobacterial agent on food, including meat, poultry and seafood. The approval was in response to a petition and documentation filed by the Electric Power Research Institute, Agriculture and Food Technology Alliance.

CFIA reports that no Canadian company has applied to Health Canada with the appropriate research/ documentation for use of ozone in food packaging and for this reason, ozone is not approved for food packaging use in Canada. Washington State producers can use ozonated water to clean oyster meat but BC producers cannot.

7.2.4 Incentive Programs and Subsidies

BC Assistance Programs

There are no specialized assistance programs for BC seafood processors such as grants, low interest loans or tax holidays. Some plants, located in coastal communities, did receive loan guarantees in the late 1990s. The BC government does not fund seafood marketing programs.

As noted earlier, WED no longer provides marketing assistance to BC seafood producers. However, its federal counterpart on the east coast, the Atlantic Canada Opportunities Agency (ACOA), does provide assistance for plant upgrade and other seafood industry endeavours. In addition, provincial governments in Atlantic Canada provide funds that qualify as a matched contribution for the Agriculture and Agrifood Canada's CAFI program.

Alaska Assistance Programs

The major assistance programs in Alaska relate to market support and market development although several plants have received generous grants and/or financing, e.g., a large cold storage facility in Anchorage.

Government market support in Alaska includes:

- up to $US 20 million in funds under the Alaska Salmon Grants Program to assist in marketing and new product development (this comprises one component of the larger $US 50 million Fisheries Revitalization Strrategy, so-called "disaster relief);
- the federal Market Access Program or MAP, an export development program to simulate demand for a broad array of Alaskan seafood products (ASMI received $US 2.4 million in 2001); and
- guaranteed purchases of canned pink salmon by the US Department of Agriculture, purchases that have amounted to more than $US 10 million annually in recent years.

The last program also encourages uneconomic Alaskan production, increased supply, and declining prices in world markets to the detriment of BC producers.

7.2.5 Federal-Provincial Cooperation

Improved federal-provincial cooperation would help in developing new fisheries.

The federal and provincial governments do cooperate on plant licensing and seafood health and safety issues (see Section 7.2). The two levels of government have also cooperated on some seafood product development initiatives such as the dogfish processing initiative for the North Coast and, much earlier, the launch of hake surimi processing operations in Ucluelet and Port Alberni.

However, as noted earlier, seafood business opportunities that the Province supports, related to new and emerging fisheries or fisheries management reform for example, can be stymied by DFO's narrow focus on resource management and conservation issues. The Province and DFO, as well as industry, are cooperating on the federal Agriculture and Agri-Food Canada seafood value chain round table, a comprehensive assessment of competitiveness issues and how to address them in order to improve export performance.

7.2.6 Aboriginal Issues

There is limited aboriginal ownership of processing plants.

Very few processing plants are owned by aboriginal interests. The Kitasoo Band in Klemtu operates a small processing plant (see Case Study in Section 6). The salmon that are caught in-river through Pilot Sales Agreements (PSA), Excess to Salmon Spawning Requirements (ESSR), and Nisga'a Treaty aboriginal commercial fisheries are mainly processed in traditional plants or sold/exported directly.

Much of the ESSR sockeye catch from the Babine Fence on the Skeena River system is custom canned by third parties and sold on world markets but the canned product is of poor quality. BC processors interviewed during this study asserted that this poor quality product, labelled as a "Product of Canada", sullies BC's quality reputation. The processors also noted that such in-river commercial aboriginal fish should be subject to the same catch monitoring and inspection requirements as other fish produced in BC.

Land claims settlements would reduce uncertainty and provide processing opportunities.

The uncertainty surrounding aboriginal land claims tends to temper investment and business planning in the processing sector. If claims were settled, there would be new opportunities for aboriginal and non-aboriginal processing ventures alike. Joint ventures offer the advantage of shared risk sharing and the joint venture partner usually provides industry knowledge, marketing expertise, and business skills which are essential in today's competitive industry.

7.3 Human Resources

The 182 processing plants active in 2002 vary greatly in employment size. The 84 smallest plants, with an average monthly employment under 10 workers, comprise only 5% of total sector employment. The 38 largest plants, with an average monthly workforce of at least 50, comprise two-thirds of total employment

Employment Size (PYs)	No. of Plants	Employment (PYs)
0-4	60	110
5-9	24	165
10-19	20	255
20-49	40	1,315
50-99	24	1,640
100+	14	2,205
	182	5,690

Source: MAFF processing Plant Employment Survey 2002

7.3.1 Labour Utilization and Wages

In 2002 the labour profile of the BC seafood processing industry was:

	Jobs	Employment (PYs)	Wages & Benefits ($ millions)
Capture Processing	6,940	4,035	143
Aquaculture Processing	2,160	1,635	59
	9,100	5,690	202

The above figures are based on the processing employment survey conducted by MAFF. The payroll burden on top of base (T4) wages in each of the capture and aquaculture processing sectors was about 25% overall and is included above (including 5% or more for WCB). The average annual wage rate in each sector, including benefits, is about $35,000.

Seasonality is a characteristic of plants processing capture species.

The capture sector has more seasonal labour and a higher ratio of peak monthly employment to average monthly employment, than does the aquaculture sector. Capture salmon and herring processing is very seasonal. In contrast, farmed salmon plants offer workers year-round employment.

Wages in BC seafood processing plants appear to be 40% or more higher than in east coast plants (Tavel, 2002).

7.3.2 Skilled Labour and Training

Processing workers tend to be older, female, and of a visible minority.

The socio-economic characteristics of the seafood processing workforce are very different than other manufacturing industries, including food manufacturing, in BC. According to the Census of Canada (Tavel, 2002):

- over one-half of the plant workforce is female;
- about one-half of the plant workforce has less than a high school education;
- over one-third of the plant workforce consists visible minorities, primarily aboriginal but also with significant Chinese, Vietnamese, and East Indian components;
- about one-half of the seafood processing jobs are in the Lower Mainland area with most of the remainder in Prince Rupert and on Vancouver Island (almost all aquaculture processing jobs are on Vancouver Island); and
- the plant workforce is older than the workforce of the province as a whole.

Many capture plants have an older workforce because, as a result of reduced salmon landings, they are not hiring new workers. The aquaculture processing workforce is younger than the capture processing workforce.

Skill Requirements and Recruitment

Plants tend to value reliability and hard work rather than specific skills.

There does not appear to be a formal recruitment process for plant workers except for highly specialized jobs such as refrigeration and stationary engineers and accountants. There is little recruitment from technical institutes. Rather, recruitment occurs from the communities at large and from families with a tradition in the industry.

Key attributes sought in recruits are reliability and a good work ethic, rather than specific skills. Most training takes place on-the-job. Production jobs in capture plants tend to be more repetitive than in aquaculture plants.

Some BC farmed salmon processing plants have made concerted efforts at implementing job rotation for production employees e.g., feeding fish to the production line, cutting, washing and grading, and packing fish. This requires that employees be trained in a multitude of job functions. Some plants also have stretching breaks to cut down on injuries and boredom.

BC has a shortage of skilled groundfish filleters.

In the capture sector, groundfish filleting remains one of the few skilled production jobs. There is a shortage of local filleters and plants often recruit workers from Newfoundland. Filleters are paid on a piece rate basis and some filleters work at more than one plant.

Training Available

BC lacks the formalized training culture of other seafood producers.

Most training is on-the-job rather than off-site at institutions. The British Columbia Institute of Technology (BCIT) and Malaspina University College in Nanaimo do offer some courses targeted at the seafood processing sector – the majority of these are at most a week in length.

The National Seafood Sector Council (NSSC) has become an important agent in seafood workforce training, particularly in HACCP, QMP, and some sanitation-related topics. Over the 1998 to 2001 period, a total of 938 individuals participated in NSSC courses (Tavel, 2002). However, formal training is still very limited. As one BC processor commented, "we do HR in this country very badly, most of our investment in training is to avoid liability not to increase productivity and profitability".

UK Group Training Associations

To ensure that the UK seafood industry has access to the training it requires, the Sea Fish Industry Authority (Seafish) supports a network of industry Group Training Associations (GTAs) that promote, develop and deliver training opportunities within their regions. Launched in the early 1980s, this network has grown to 17 GTAs covering almost the entire country. Administrative funding comes from the Seafish levy on all first-hand purchases of sea fish, shellfish and sea fish products landed in the UK.

Each GTA is run by an industry management committee drawn from the four sectors of fishing, processing, retailing and food service. Training staff act as the contact point for industry training enquiries and coordinate the delivery of cost-effective training on a variety of topics in their region. Among its other functions, the GTA undertakes regular training needs analyses, establishes close relationships with training providers, accesses external funding support and promotes career opportunities with the industry.

Industry-led GTAs offer a comprehensive, integrated training program across all sectors that seems to meet the needs of both existing workers and new entrants. Secure funding is important to the development of an organization that can provide cost-effective training on an ongoing basis.

Countries such as the UK, Norway, and New Zealand appear to have more formalized and advanced training programs for seafood industry workers than does Canada.

The processing sector needs workers with better skills and education, but younger workers do not view processing as a career.

The BC capture seafood processing sector has a dilemma. On the one hand, it has trouble recruiting young workers because it cannot offer interesting year-round work. Young people do not see seafood processing as a career. On the other hand, it has a high proportion of older workers who have substantial experience and capabilities in existing plant practices but who also have limited ability and inclination to learn and retrain for new job functions. When these older workers retire, there will be immediate job openings that may be difficult to fill, but new recruits offer the potential for a better skilled and educated workforce.

The BC seafood processing workforce needs to reskill in order to assist the transition of the industry to a market-driven business. This will require enhanced skills in quality control and grading, food safety and HACCP, and in traceability procedures that will frame the industry of the future. These in turn require higher education, better technological skills, and the ability to embrace "lifelong learning" practices to adapt to future industry requirements. Attracting such workers requires the ability to provide year-round job opportunities at competitive wages.

7.3.3 Labour and Management Environment

Labour-management relations have improved somewhat in the large unionized plants.

The labour-management environment in BC unionized plants traditionally has been volatile and confrontational. However, the harsh realities of the salmon marketplace in recent years have tempered this animosity to a large degree. There is greater cooperation and understanding of each other's position. The UFAWU, representing workers in several large plants, has agreed to a lower wage scale, in some instances, for processing non-traditional species. The UFAWU and some companies, such as the Canadian Fishing Company, have also signed multi-year agreements.

There is still a substantial division of opinion on job flexibility with plant management wanting individuals to be able to fulfill more than one job function if needed, e.g., to work on a forklift and also on a production line in a single shift, while the union wants to maintain the status quo of rigid job descriptions for each worker. The lack of flexibility can result in a large seafood company such as the Canadian Fishing Company having part of their herring custom processed at a non-union operation.

As noted earlier, farmed salmon plants have this flexibility. In part because they are newer operations, farmed salmon processors do not appear to have significant labour-management issues. This is also true for non-unionized plants in the capture seafood processing sector.

7.4 *Investment, Financing and Capital*

7.4.1 Investment Levels

Financial information is difficult to obtain as most processing companies are private.

Fish processing companies in BC are typically private rather than public companies. Accordingly, little financial information on investment levels and on return on investment is readily available for the sector. For this study, Statistics Canada was contracted to conduct special financial analysis of selected income statement and balance sheets items from corporation financial statistics for the BC "Seafood Product Preparation and Packaging" sector (NAICS Sector 3117).

The results suggested the 2002 investment base to be $250 to $300 million on a net fixed assets basis with industry equity pegged at about a third of this figure.

7.4.2 Viability and Financial Performance

Many processors do not have financial targets for their business. They indicate that the characteristics of the business, especially the salmon and herring business, defy traditional business assessment. Moreover, with the perilous financial state of the industry, their primary concern is not return on investment but rather short term cash flow. Two typical comments are:

- *...we have financial targets but we only achieve them 1 in 5 years.*
- *You can't form a business plan for the salmon industry today.*

We suggest that BC seafood processors need to earn an EBITDA (Earnings Before Interest Taxes Depreciation and Amortization) of 10% of sales. This would translate into a target of 3-5% net income before taxes.

Overall, financial performance is inadequate, particularly for salmon.

The consensus from study interviews is that the overall financial performance of the BC fish processing sector has been inadequate for close to a decade. Wild salmon plants have seen low volumes and soft markets with the result that overhead costs represent a larger share of each sales dollar. In contrast, herring processing returns have been good since the processing sector can predict the timing, quantity, and quality of herring catches under the pool management system, and since the Japanese market has been relatively stable over the past few years.

	EBITDA		
	1999	2000	2001
BC Seafood Processors	6.9%	6.1%	4.5%
Canadian Seafood Processors	7.6%	7.6%	6.0%
Canadian Food Manufacturers	7.5%	8.2%	8.3%
US Food Manufacturers	14.5%	14.4%	14.9%

Source: Seafood - Special tabulations by Statistics Canada
Food - Deloitte & Touche "Benchmarking for Success: Food Processing in Canada 2002"

More predictable volumes help in business planning.

Hake processors indicate that the uncertainty and late announcements by DFO as to fishing plans wreaks havoc with their business plans and bottom line. The recently-signed hake treaty with the US should allow more timely fishing plans. Some specialized groundfish processing plants and farmed salmon processing plants, many of which are custom processors, have fared better due to more predictable volumes throughout the year and higher quality raw material.

Financial performance lags behind other food manufacturing industries in North America.

Available evidence from Statistics Canada and other sources indicates that the financial performance of BC seafood processors lags behind the total seafood processing sector in Canada, and the overall food manufacturing industries in Canada and the US.

7.4.3 Access to Financing and Equity

There is limited financial information on BC seafood processing operations. Most of BC seafood processors are not public companies. Many farmed salmon processors are owned by multinationals that do not produce stand alone financials for BC operations.

Uncertainty limits financing options.

However, the poor financial returns in recent years and the uncertainty related to domestic raw material supply, reflecting regulatory and aboriginal land claims issues, suggest that equity investment is scarce. Financing is dependent on a viable business plan. Constructing such a plan is problematic in light of this uncertainty.

7.4.4 Research and Development (R&D)

Research and development in new products and new production technologies is presently limited. Some advances have been made over the past decade, e.g., essentially all herring roe is extracted or "popped" by machine today, retort pouches for smoked salmon products are common. Skinless boneless canned salmon has met market acceptance. In addition, several new state-of-the-art farmed salmon processing plants have been constructed.

Developing value-added products can be costly.

Past attempts by BC producers to develop and market value-added products other than fillets and portions have generally been unsuccessful. Flavoured canned fish products, frozen fish dinner entrées, specialized dogfish products for the UK market, etc. have been tried. In most cases, the cost increases have exceeded the price increases over traditional products.

In addition, tariff and non-tariff trade barriers make BC processed seafood products such as smoked fish uncompetitive in many international markets (see Section 3.2.2).

7.4.5 Overall Investment Climate

The overall investment climate in BC seafood processing is poor. The capture salmon processing sector has short term cash flow issues and not long term investment and returns as their primary focus. The fact that salmon does not make a contribution to overhead drags down the overall financial performance of these operations.

SARA could significantly reduce sockeye raw material volumes available to BC seafood producers with a resulting erosion of market share and viability in key export markets such as the UK and Japan.

To avoid the risk of carrying large overhead, many seafood processors are using custom processors.

Many seafood processors are avoiding risk and avoiding risk means avoiding fixed costs, such as using custom processors. As a result, custom processors without large fixed overheads and some specialized groundfish processors are faring better.

The strengthening of the Canadian dollar during 2003 has had a major detrimental effect on the processing sector's viability and outlook, especially for several businesses such as groundfish plants heavily dependent on the US market.

All processing industry segments are affected by the uncertainty surrounding aboriginal land claims. Aboriginal issues can critically affect raw material volumes for plant operations. This uncertainty tends to limit major investment.

7.5 *Supply Chain Issues and Services*

To ensure adequate volumes, BC processors are increasingly sourcing raw material from outside the province.

The major supply chain issue is an adequate supply of raw material for processing. With the downturn in domestic supply from BC sources, specifically for salmon, BC processors are increasingly accessing raw material outside BC. Some plants with canning lines are importing fish from Alaska for processing. Some BC seafood distributors are buying salmon canned in Southeast Asia using frozen raw material, and distributing it under their own trade label. Other specialty producers of value-added smoked products, for example, are importing frozen whole salmon from Norway and Chile to serve their product lines. Herring and halibut are also imported from Alaska for processing in BC.

The introduction of quota management systems during the 1990s in some cases has resulted in new processors rather than existing processors accessing the raw material supply, e.g., SM Products did not exist in the 1980s but is now the largest buyer/processor of halibut in BC.

There do not appear to be any major supply constraints for important goods and services such as cans, packaging materials, and trucking services, to the BC seafood sector.

7.6 Production Monitoring

A condition of the provincial fish processing licence is the completion of the Annual Fisheries Production Schedule (AFPS) at calendar year-end. The AFPS reports wholesale weights and values for a variety of product forms by species. The Ministry of Agriculture, Food & Fisheries (MAFF) publishes the results in their annual 8 page Seafood Year in Review document.

7.7 Industry Liaison and Relationships

There is not a high degree of industry liaison and strategic alliances in the BC seafood sector.

7.7.1 Industry Associations

The BC Seafood Alliance represents a diverse group of seafood industry organizations.

Industry associations for seafood processors are limited. The Fisheries Council of BC (FCBC), the voice of the large capture industry processors, disbanded in the late 1990s. Some ex-FCBC members are members of the Fisheries Council of Canada. There are no industry associations for medium or small sized processors.

As explained in Section 5.7.1, the BC Seafood Alliance, consisting of more than a dozen seafood industry organizations, has the goal of growing the total value of the processed seafood sector and engaging the diverse interests to cooperate in achieving that goal.

7.7.2 Integration and Strategic Alliances

Harvester-processor cooperation is substantial in IQ fisheries, less so in the salmon fishery.

There is substantial cooperation and alliances between fishermen in Individual Quota (IQ) fisheries and their buyers/processors. But the degree of cooperation between harvesters and processors is much less in the competitive salmon capture fishery. In fact, the present management system prevents needed cooperation to a large degree.

There is limited interaction between capture and farmed finfish processing plants although undoubtedly each could learn from one another and benefit from stronger alliances. The major BC salmon farming companies are part of large multinational corporations and hence they have access to marketing and other expertise.

7.7.3 Public Perception

The public awareness of the BC seafood processing industry, as a separate entity from capture harvesting and aquaculture growout operations, is limited.

Public awareness of the seafood processing industry is limited.

The public identifies primarily with the primary production phase of fisheries and aquaculture and their various issues and controversies. Seafood processing alone is relatively anonymous. However, the public perception of capture and aquaculture sectors does significantly affect the fortunes of the processing sector. For example, some farmed salmon processing plants report difficulty recruiting workers due to the public image of aquaculture in the community.

Part D. Recreational Fishery Assessment

8.0 RECREATIONAL FISHING INDUSTRY PROFILE

Angling in tidal waters or saltwater is a form of outdoor recreation. Most anglers fish not only to harvest fish but also to enjoy the broader recreational experience – the "expectation and opportunity" of angling.

A wide diversity of experiences can be created by combining equipment, services, time, location and other factors. Angling techniques include trolling, mooching, jigging, and casting with bait, lures, and flies. While boats are commonly used, fishing may also take place from a pier, shore, or beach.

8.1 The Recreational Fishing Business

8.1.1 Nature of the Business

Recreational fishing is a service industry focused on the broader angling experience.

The recreational fishery is a service industry that is focused on producing the angling experience. For individual anglers, the quality of the angling experience is affected by fish availability, fishing success rates, fish species and size, and several non-fish related factors, such as the environmental setting, congestion, and camaraderie with other anglers. Three separate components to the experience can be identified:

- **catching of fish** – regardless of whether or not the fish is harvested;
- **harvesting of fish** – for those anglers who choose to do so; and
- **aesthetic experience** – derived from the natural environment.

Given these distinct components, angling activity is measured not in units of fish caught or harvested, but in "angler-days" – defined as one angler fishing for any part of a single day. The fact that angling entails more than harvesting fish explains why anglers are willing to spend much more on gear, transportation, and other goods and services than the cost of purchasing the equivalent weight of fish in the retail market. It also explains why anglers can enjoy a fishing experience even if they catch no fish or do not eat the fish they catch.

8.1.2 Industry Elements

Recreational fishing services are provided by lodges, charters, and anglers themselves.

Anglers may access a range of services to enhance their experience, or they may rely on their own resources. Despite its diversity, recreational experience can be classified into the following major categories:

- **Lodges** typically offer all-inclusive packages comprising accommodation, meals, boat and fuel, fishing equipment, and sometimes a fishing guide who navigates and assists in catching fish. Lodge packages are often three to five days in duration.
- **Charters** are angling packages that include boat, equipment and guide, but no accommodation or meals. Charter packages generally last for one day or a half-day. There are however, charter operations that in concert with accommodation facilities offer two to five day packages.
- **Independent** anglers are responsible for their own fishing gear, boat and fuel, accommodation, meals, and transportation.

Lodges and charters (producers) provide packages to sell the fishing experience to anglers (consumers). In contrast, the independent angler produces the experience for his or her own immediate consumption. An individual may fish on their own for certain fishing trips but also may utilize guides (charter services) or frequent lodge facilities on other trips. Some anglers have their catch custom processed, packaged, or shipped by air.

8.2 *Industry Profile*

There are currently about 125 fishing lodges, 500 charters, and 330,000 licensed tidal anglers in British Columbia. (These figures exclude recreational activity in freshwater.) Many fishing guides who work for lodge or charter operations are self-employed. Most charter operations comprise a single owner-operator guide. Substantial numbers of fishing gear stores, air charter companies, boat dealers, tackle and bait distributors, and other businesses also serve the recreational sector.

8.2.1 Regulation

DFO and MAFF regulate the BC tidal recreational fishery.

The federal government, through DFO, regulates the BC tidal recreational fishery, issuing licences and setting licence fees, daily and annual catch limits, and season and area gear restrictions for anglers. Recreational fishing lodges that provide processing services to their guests must comply with DFO and MAFF processing requirements.

The number of recreational fishing licences generally grew from the mid-1980s through the early 1990s, declined in the late 1990s, and remained relatively constant since 1998 (see Exhibit 28). Sales of annual licences have declined by more than a half since the mid-1980s, with short-term (1 to 5 day) licences comprising an increasing share of total licence sales.

Although there are no licensing requirements for lodges and charters other than those for a normal business (e.g., a business licence), and for individuals piloting boats (e.g., Transport Canada authorization), there are numerous environmental criteria and lease and assessment fees levied on lodges.

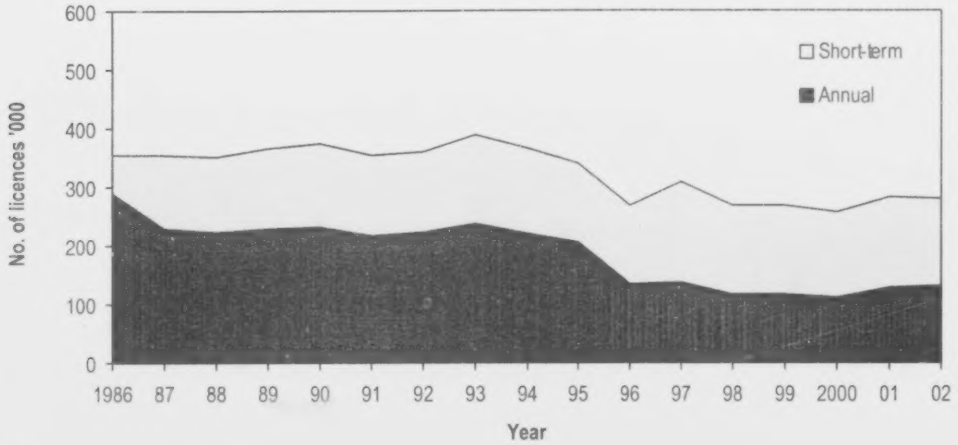
8.2.2 Industry Structure

The recreational fishing industry consists primarily of a large number of small businesses.

The recreational fishery and its businesses comprise part of the broader outdoor recreation and tourism sectors. The recreational fishing business, like the tourism sector as a whole, is composed of thousands of relatively small, independently owned, often family-run businesses. Many of these businesses, such as sporting good stores, motels and marinas, earn only part of their revenue stream from anglers.

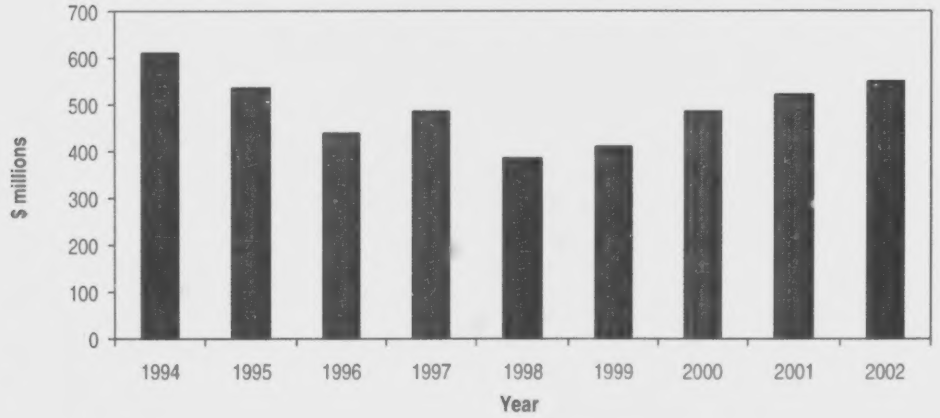
Fishing lodges and charters focus on angler clientele. There are a few large companies that own several lodges or operate several charter boats, but no one company represents 15% or more of the revenue base of the sector. Some fishing lodges are owned by large forest companies, retail conglomerates, or other "deep pocket" concerns, and do not necessarily operate as a stand-alone business.

Exhibit 28: BC Tidal Recreational Fishing Licence Sales to Adults – 1986/87 to 2002/03



Note: Short-term is 1 to 5 day licence.
Source: DFO

Exhibit 29: BC Tidal Angling Expenditures



Source: GSGislason & Associates Ltd. estimates.

8.2.3 Industry Revenues

A Decline in Revenue

Angler expenditures fell during the late 1990s (see Exhibit 29). From $611 million in 1994, total expenditures dropped to below $400 million in 1998, before rebounding to $487 million in 2000 and an estimated $550 million in 2001. The lodge sector has fared better than the charter and independent angling sectors in maintaining and growing its revenue base. For example, demand by corporate groups, a key component of the lodge sector's client base, remains strong.

After falling in the late 1990s, angler expenditures have rebounded with improved stocks and less restrictive regulations.

The decline experienced in the late 1990s reflected a combination of factors, including the weak economy, forest sector business closings and layoffs, changing demographics, stock reductions of chinook and coho salmon, and associated regulatory restrictions. In addition, the late announcements and uncertainty surrounding the more restrictive regulations undermined the "expectation and opportunity" to catch fish. The recent rebound in expenditures reflects improved stock abundance, a return to less restrictive regulations, more timely announcements by DFO regarding regulations, and favourable policy initiatives.

The 2002 tidal recreational fishery generated 2.1 million angler-days of activity and an estimated $550 million in sales – $120 million to lodges, $30 million to charters, and $400 million to boat and equipment dealers, accommodation facilities, and various other retail businesses. (These sales figures include applicable sales taxes.)

The Strait of Georgia

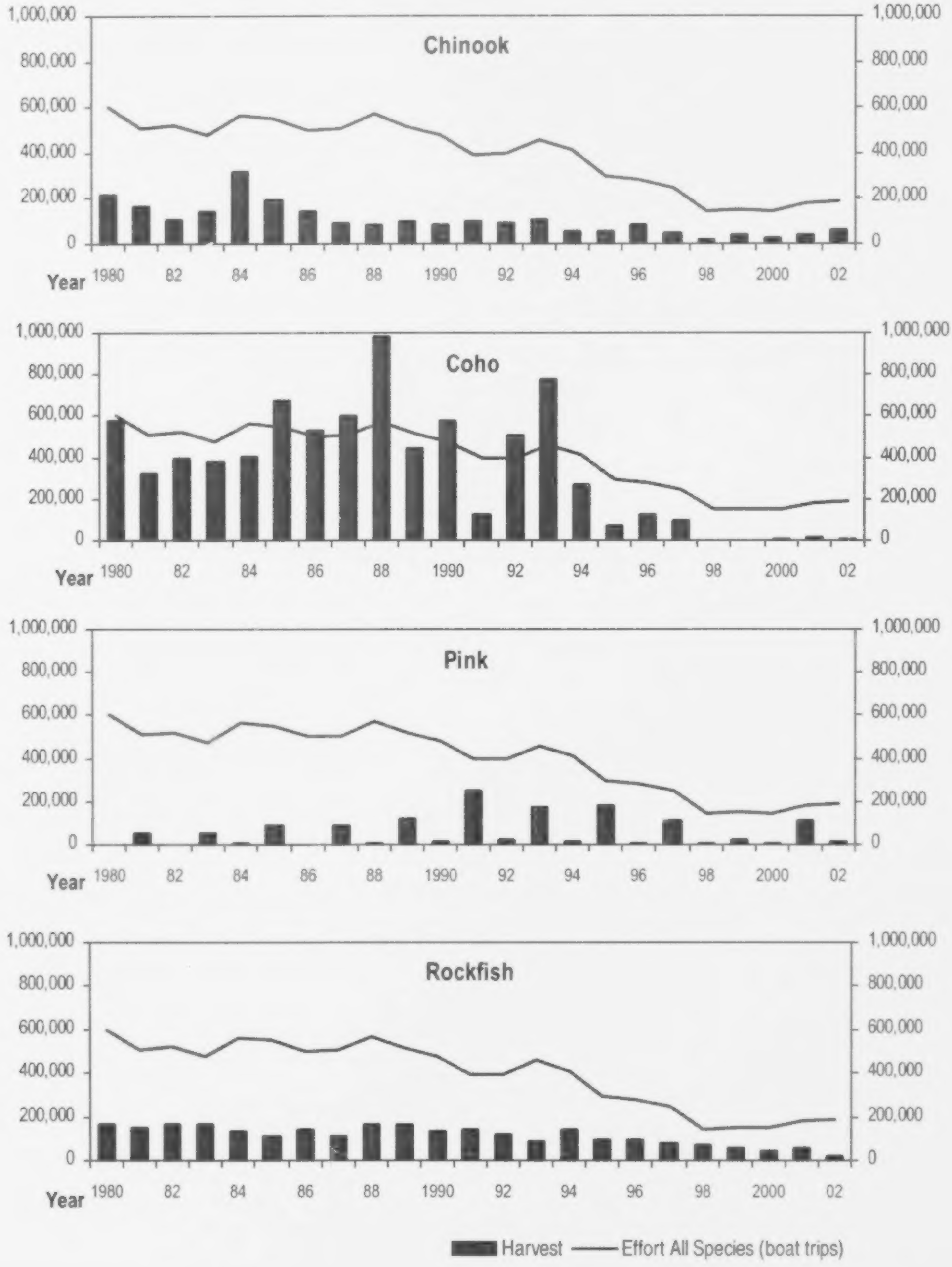
While Georgia Strait traditionally provided one-half or more of coast-wide angling effort, today its share is only one-third. Part of this decline in importance is due to expansion of angling on the West Coast of Vancouver Island (WCVI) and in the Central and North Coasts and the Queen Charlotte Islands (QCI). The main factor, however, is a reduction in fishing quality in the Strait, specifically for coho.

Declining coho stocks are largely responsible for reduced angling activity in the Georgia Strait

Coho populations, in general, declined during the late 1990s (see Exhibit 30). Also, since the early 1990s, the coho that normally migrate through Johnstone Strait to Georgia Strait during the summer months have moved into the West Coast of Vancouver Island. As a result of this outside coho distribution and fishing closures for wild coho, coho fishing effort and catch in upper Georgia Strait have fallen drastically. Recreational coho harvests exceeded 500,000 fish annually during much of the 1980s, but coho harvests in recent years have been less than 10,000 fish.

With respect to other species, Georgia Strait as a whole has experienced a two-thirds decline in angler effort and catches for chinook over the past two decades. In contrast, angler harvests of pink, chum and sockeye salmon have increased over the same period. Catches of rockfish and lingcod have declined dramatically in response to regulation changes. As in the case of the commercial fishery, recreational pink salmon catches demonstrate a profound annual pattern, with catches in odd-numbered years much higher than in even-numbered years.

Exhibit 30: Georgia Strait Recreational Catch & Effort May to September – 1980 to 2002



Source: DFO Georgia Strait Creel Survey and GSGislason & Associates Ltd.

Exhibit 31: Estimated Employment & Wages in BC Tidal Recreational Fishing 2002

No. of Operations	
Lodges	125
Charters	500
Angling Licences	333,800
Employment Measures	
Jobs	7,240
Employment (PYs)	3,590
Employment by Region (PYs)	
Queen Charlotte Islands	100
North Coast↓	220
Central Coast	65
North Vancouver Island	210
Mid Vancouver Island	615
South Vancouver Island	255
Upper West Coast Vancouver Island	60
Lower West Coast Vancouver Island	430
Victoria & Area	415
Sunshine Coast	110
Vancouver & Other	1,110
Total	3,590

Employment by Type (PYs)	
Lodges	820
Charters	300
Other	2,470
Total	3,590
Aboriginal Share of Employment	3%
Wage Payments	
Wages & Benefits	$125 million
Wages per PY	$34,800

Notes: 1. *PYs is person-years.*
2. *Region is region of worker residence not the region where the angling activity occurs.*
3. *Aboriginal share of employment is approximate.*

Source: GSGislason & Associates Ltd. estimates.

8.2.4 Employment and Wages

Employment and average earnings are estimated at 3,590 person-years and $34,800 per PY, respectively.

In 2002 the recreational fishing sector had an estimated 7,240 jobs and 3,590 person-years (PYs) of employment. Most recreational fishing jobs are seasonal in nature (see Exhibit 31). The wage and benefits bill of this employment is estimated at $125 million in total, or $34,800 per PY.

8.2.5 Regional and Aboriginal Participation

Recreational fishing jobs and employment occur throughout the province. (Employment area in Exhibit 31 refers to a worker's region of permanent residence.)

Jobs are concentrated on Vancouver Island and the Lower Mainland, with some growth in aboriginal participation.

The Lower Mainland has a relatively large 30% share of total employment for several reasons: many of the boat and equipment dealers reside there; anglers spend money in the Vancouver area in transit to their fishing location; and a large number of the seasonal jobs at lodges are staffed by Vancouver and Victoria area residents (often university students).

The aboriginal share of employment is estimated at 3%. This share has been growing, with the launch of several aboriginal-owned lodges and increased aboriginal hiring among businesses. For example, some lodges in the Queen Charlotte Islands have made a concerted effort to hire Haida Gwaii workers (GSGislason & Associates Ltd. "The Queen Charlotte Islands Fishing Lodge Industry", 2003).

9.0 TIDAL RECREATIONAL FISHING BUSINESS

The tidal recreational fishing sector in British Columbia has undergone substantial change over the past ten years. Change has occurred in angler demographics, markets, the regulatory environment, and fish stock abundance.

A major competitor in salmon and halibut angling is Alaska. There is potential to learn from the Alaskan experience and, accordingly, some details on Alaskan resource management and angling activity are provided.

9.1 *Markets*

The 2002 tidal or saltwater recreational fishery in the province involved an estimated 2.1 million angler-days of activity – 1.65 million days of boat-based angling (79%) and 0.45 million days of shore and other land-based angling (21%). Anglers spent an estimated $550 million.

9.1.1 Domestic and Export Markets

Geographical Origin

The BC tidal recreational fishery has both domestic and export components. From a provincial perspective, the domestic component comprises BC anglers, their activity and expenditures, while the export component consists of those anglers travelling from outside the province to fish in BC.

BC residents account for more than three-quarters of tidal angling activity in the province.

The vast majority of BC tidal angling is conducted by provincial residents, who fish twice the days on average than do non-residents (DFO, *2000 Survey of Recreational Fishing in Canada*). Albertans are responsible for approximately two-thirds of other Canadian angling activity. About 70% of non-Canadian angling activity is done by US residents in the I-5 Interstate Highway corridor areas of Washington, Oregon, and California (primarily Washington).

2000 Tidal Angling in BC

	Share of Anglers	Share of Angler-Days	Days per Angler
BC Residents	64%	78%	8.6
Other Canadian	13%	8%	4.1
Non-Canadian	23%	14%	4.2

Source: DFO, "2000 Survey of Recreational Fishing in Canada"

The DFO National Survey indicates that the share of anglers from BC has fallen slightly since 1990. This decline reflects an increasing share of angler activity conducted through lodge and charter businesses, which attract more out-of-province anglers.

Boat and Shore-based Angling

The share of shore-based angling has been growing in certain areas.

Traditionally, boat-based angling has formed the vast majority of saltwater angling in BC. However, the share of anglers fishing from shore, pier, or tidal bars has been increasing. In particular, the East Coast of Vancouver Island supports an extensive shore fishery for pink and coho salmon. Many Vancouver area and Fraser Valley anglers fish from river bars on the Fraser River (in tidalwater downstream of the Mission Bridge).

Some of the shore-based angling results from local enhancement efforts. For example, pink salmon are raised as juveniles in netpens at the Campbell River Fishing Pier. They are then released and subsequently return as adults from their ocean migration, to support an extensive fishery at the pier.

Relative to boat-based angling, shore-based angling has several advantages in that it: (1) is much cheaper; (2) does not necessarily demand a lot of skill (e.g., kids can participate); (3) caters more to families; and (4) needs less advance planning. However, chinook is still the focal point of saltwater angling in BC, and chinook fishing requires the use of boats in deep water and substantial angler skill.

Marketing Activities of Lodges and Charters

Many lodge and charter operators have developed websites to reach and recruit potential customers. Some have print and telephone contact with clients, while most still attend trade shows during the January to March period. However, repeat business and "word-of-mouth" remain key to industry success.

Competition

Alaska and other recreational activities are the main competition for BC tidal angling.

The BC tidal recreational fishery competes with many other endeavours, since angling expenditures and time reflect discretionary dollars that have many other alternative uses, including:

- other saltwater angling (Alaska, California, Florida, Mexico);
- freshwater angling (BC and other Canadian, lower 48); and
- other outdoor recreation (golf, ecotourism, etc.).

Tidal angling is one of a suite of outdoor recreation activities, some of which are complementary. For anglers interested in salmon and halibut fishing, Alaska is the main competition.

The corporate business or incentive travel market is an important market segment for many lodges. This market faces intense competition from golf and "hot weather" tourist destinations, such as California, Arizona, Mexico, the Caribbean, and Hawaii.

Demographics and Angler Trends

BC's population, now at more than four million people, has grown rapidly, fuelled until recently by immigration. Much of this immigration has come from Asian countries. The population of those born in Canada is aging as the "baby boomer" cohort advances.

Provincial population growth has been concentrated in urban areas of Greater Vancouver, Victoria, and the Okanagan. The population of many other regions has actually fallen since the mid-1990s, with the decline in the resource-based industries of forestry, mining, and commercial fishing. As well, recent immigrants have tended to settle in the larger cities. Thus, British Columbia, like the rest of North America, is witnessing a trend to urbanization.

The decline in resident angling is partly due to immigration, urbanization, and an aging population.

All of these factors – immigration, an aging population and urbanization – have contributed to reduced angling by BC residents. Between 1986/87 and 2002/03, the number of angling licences sold to Canadian residents declined by a third, but the number of non-resident of Canada licences remained essentially the same.

This phenomenon has been experienced in other provinces, and in fact across North America. US-based research on the resident angler indicates that:

- About half of anglers licensed in any given year do not renew their licence the following year.
- Inadequate time is the most frequently cited reason for not fishing more often or at all.
- Spending time with family and friends is the best enticement to get an occasional angler back to the activity.
- Many anglers prefer to fish only a few hours at a time, at a fishing spot within an hour's drive, and with little advance planning.

Promotion, advertising and education can help increase angling activity levels.

The US research also shows that occasional and lapsed anglers are the best targets for promotional and advertising campaigns. In addition, these campaigns need to be combined with education on angling opportunities. Many people, especially urban dwellers, cite lack of information about where to fish and how to catch fish as a constraint to participation.

The Government of Manitoba recently developed an education program aimed at providing information to urban youth on angling opportunities in their backyard. The program included simple measures, such as a map with fishing sites and information on accessing these sites through public transit.

9.1.2 The Cost of Angling

The average cost of an angler-day was estimated at $262 in 2002, a 16% increase over the $226 average cost in 1994. Average costs by type of experience in 2002 were:

- $780 per lodge angler-day ($600 to the lodge, $180 to others);
- $510 per charter angler-day; ($300 to the charter, $210 to others); and
- $190 per independent angler-day (mainly boats and equipment).

For lodge and charter anglers, the above figure includes angler expenditures on travel, meals, accommodation, etc. that do not flow through the till of lodges and charters.

The cost of angling at a lodge can range from $200 to $1,000 per day, depending on the amenities included. Some lodges are located in remote locations and have packages that include air transport from Vancouver and the use of a guide. Others are in a more urban environment and exclude these features. The cost of fishing charters is typically $60 to $90 per hour, with a five-hour minimum.

	Types of Angling			
	Lodges	Charters	Independent	All
1994				
Angler-Days	200,000	150,000	2,350,000	2,700,000
Share of Activity by Non-Canadians	46%	31%	9%	13%
Angler Retail Purchases ($ millions)				
Boats and Equipment	1	1	252	254
Lodges/Charters	94	30	0	124
Other Direct Costs	25	19	189	233
Subtotal	120	50	441	611
2002				
Angler-Days	200,000	100,000	1,800,000	2,100,000
Share of Activity by Non-Canadians	46%	31%	9%	14%
Angler Retail Purchases ($ millions)				
Boats and Equipment	1	1	223	225
Lodges/Charters	120	30	0	150
Other Direct Costs	35	20	120	175
Subtotal	156	51	343	550

Source: GSGislason & Associates Ltd. estimates.

An average BC angler-day cost $Cdn 262 in 2002, compared to Alaska's $US 249 in 2000.

By way of comparison, the average cost of an angler-day in Alaskan tidal waters was $249 US in 2000. It is less costly to fish recreationally in BC, primarily because of the higher cost of travel to Alaska for non-resident anglers. However, the strengthening of the Canadian dollar relative to the US dollar since January 2003 has undermined our cost-competitiveness in attracting US anglers.

9.1.3 Product Quality and Differentiation

The angling outdoor recreation product has two main attributes, fish-related (species, number, size) and aesthetic (natural setting, crowding, etc.).

Fish Attributes

BC as a whole has lower harvest rates than Alaska for salmon and halibut angling.

Alaska appears to have an advantage over BC in harvest rates for salmon and halibut angling. Alaskan tidal anglers average 0.6 salmon, 60% of which are coho, and 0.4 halibut per angler-day (see Exhibit 32). While reliable harvest estimates for the province are not available, the average harvest per angler-day would be much lower in BC, especially for halibut. However, the Queen Charlotte Islands, Prince Rupert, Central Coast, and West Coast of Vancouver Island would have fish populations and harvest rates comparable to those in Alaska. BC coast-wide results are distorted by the substantial decline in activity and success in Georgia Strait since the early 1990s.

BC angler catches and catch rates have increased over the past three years, in response to vastly improved returns of chinook and coho salmon. Queen Charlotte Island lodges report that 2003 had the best chinook fishing in memory.

The province has much better saltwater angling opportunities than Washington State or Oregon. It does have an advantage over Alaska in shore angling, with more gentle sloping and accessible shoreline on saltwater. Both shore fishing and flyfishing are growth segments for angler activity in BC.

Aesthetic Attributes

BC has strong natural attributes for angling, although there is increased crowding in some areas.

British Columbia has relatively undisturbed shoreline, clean water and a wide variety of spectacular vistas relative to the lower 48 states. In particular, the remote areas of the West Coast of Vancouver Island, Central and North coasts and Queen Charlotte Islands are still relatively unspoiled and rival viewscapes in Alaska.

Northern areas such as Prince Rupert are reporting continued angler-growth, in part from anglers seeking less crowded conditions – crowding is becoming an issue in certain locations. Commercial-recreational visual conflicts today are much less than they were ten years ago, due to the substantial downsizing of the commercial fleets (anglers do not like to see commercial boats operating in the area in which they are fishing and vice versa).

Product Differentiation of Lodges and Charters

Lodges and charters try to differentiate themselves on the basis of access to fish or ability to find fish, the environmental setting, and services offered. Some operators include marine mammal and wildlife viewing as an intrinsic part of the client experience. Others set crab and prawn traps to provide a meal for clients.

Packaging of angling and other recreation experience is used for product differentiation.

The packaging of different components of the recreation experience is increasingly popular. Examples of innovative packaging and services by lodges and charters include:

- At least one lodge in Tofino offers a package that includes a pass to Pacific Rim National Park.
- An operator and a local resort offer a combination angling-spa package.
- Several operators offer flyfishing on light tackle (some in high alpine freshwater lakes).
- Fall chum angling packages have developed in the Campbell River area.
- Family and women-only weekends are offered at lodges.
- Combination fishing-golfing packages are being marketed.
- Some packages include very high quality food, with executive chefs and fine wine (at least one lodge has a food and wine festival weekend late in the season).

This trend to packaging is consistent with broad tourism industry trends.

Exhibit 32: The Recreational Fishery in Alaska – A Competitor for Angling Dollars

The Alaska Department of Fish and Game regulates freshwater and saltwater fisheries under one licensing system.

Licensing of Anglers. Anglers aged 16 years and older must be licensed and pay fees: $15 annually for residents of Alaska and $10 to $100 for non-residents ($10 for 1day, $20 for 3 days, $30 for 7 days, and $50 for 7 days, or $100 annually). Anglers fishing for chinook must buy a "King Salmon Tag": $10 for Alaskan residents and $10 (1 day) to $100 (annual) for non-residents. Alaska does not have a sales tax.

Saltwater chinook limits are 2 daily, 2 possession for residents and 1 daily, 1 possession, and 3 annual for non-residents. (Non-residents must keep a chinook harvest record.) Limits for all anglers for other species include: 6 daily and 12 possession for coho; 10 daily and 10 possession for chum, pink, and sockeye in combination; and 2 daily and 4 possession for halibut. Possession limits do not apply to "preserved" fish (e.g., frozen, canned).

Angling Activity. In 2000 there were 458,639 angling licence sales (30% by residents) and 432,300 active anglers.

2000 Activity		Saltwater	Freshwater	Total
Angler-Days		969,700	1,658,100	2,627,800
Harvest	- chinook	83,400	94,500	177,900
	- sockeye	25,400	402,700	428,100
	- coho	363,800	300,900	664,700
	- pink	105,500	59,300	164,800
	- chum	28,400	13,400	41,800
	- halibut	403,300	0	403,300
	- rockfish	131,700	0	131,700
	- lingcod	34,800	0	34,800
	- razor clams	879,300	0	879,300
	- trout & char	22,600	221,800	244,400
	- Arctic grayling	0	28,800	28,800
	- Northern pike	0	18,100	18,100
Angler Expenditures $ millions US		241	334	575

Requirements for Fishing Guides. All fishing guide businesses, saltwater and freshwater, are regulated:

- Guide businesses must register annually (at no cost, but must have a $50 Alaska Business Licence).
- Fishing guides must register annually (at no cost), and may only guide as an employee of a registered fishing guide business.
- Each vessel used in guiding must be licensed by the Commercial Fisheries Entry Commission ($20 fee if under 25', $50 fee if 25' to 50').
- Guides operating motorized vessels must obtain a Coast Guard operator's licence – a so-called "6 Pack" Licence – and be enrolled in a random drug-testing program.
- Every operator of a saltwater guide vessel must obtain a logbook and submit reports weekly (with non-compliance punishable by a fine).

In 2002, there were 1,350 registered saltwater fishing guide businesses, 1,882 licensed saltwater guide vessels, and approximately 2,200 registered saltwater guides in Alaska.

9.2 Government Policies and Regulations

The federal government, through DFO, has responsibility for licensing and regulation of saltwater (tidal) angling in British Columbia. The provincial government is responsible for licensing and regulation of the freshwater fishery.

9.2.1 Resource Access

Licensing But No Limited Entry

All anglers must be licensed, and observe catch limits (daily, possession, and in some cases annual), seasons, fishing area and gear, and other restrictions. Anglers who are 16 years and older pay fees. There are no restrictions or limited entry on how many licences can be sold, how many individuals can fish recreationally, and how many angler-days can be expended.

Allocation Policy

The recreational sector has priority access to chinook and coho.

In 1999 DFO gave the recreational sector priority access over the commercial sector to chinook and coho salmon, and gave the commercial sector priority access to sockeye, pink, and chum salmon (DFO, *Salmon Allocation Policy*, 1999). The priority recreational access is to "directed fisheries on chinook and coho salmon" after priority access for First Nations food, social, and ceremonial needs have been addressed. In addition, the policy provides anglers with "predictable and stable fishing opportunities for sockeye, pink, and chum" capped at 5% of the combined recreational-commercial harvest of each of these species. In October 2003 the Minister of Fisheries and Oceans announced that a 12 percent catch "ceiling" of the total commercial – recreational allowable catch for halibut will be allocated to the recreational sector.

Recreational fishermen in certain areas are increasingly targeting crabs and prawns, species that are very valuable to the commercial fishery and of increasing value to the recreational fishery. Intersectoral conflicts are looming for shellfish species. Increasingly, people are discussing and debating the pros and cons of formal allocation and/or limited entry to recreational fisheries, especially in the case of high value fish and shellfish species.

Regulatory Uncertainty

In the mid-to-late 1990s, poor ocean survival of salmon stocks led to decreased angler access to salmon, as DFO restricted both angling catch limits and designated angling areas. For example, in June 1999 "red" and "yellow" fishing zones were announced to protect threatened coho stocks. A lack of clarity in newspaper articles and other mass media about salmon stocks and areas with restrictions caused confusion in the marketplace and further exacerbated a difficult situation.

The potential for abrupt regulatory changes continues to threaten industry activity.

Over the past several years, DFO has provided some early signals to industry that the regulatory environment, in terms of catch limits and allowable fishing areas, will remain stable. This stability contrasts with the considerable confusion and misinformation characterising the angler marketplace in the late 1990s. However, it is still possible that untimely regulatory changes, in response to conservation concerns, could undermine industry marketing efforts and angler confidence.

One current area of concern is the sockeye fishery targeted at Fraser River stocks. In some years, recreational fishing for Fraser River sockeye has been subject to abrupt closures. Industry reports that these last-minute closures have made the fishery difficult to market to clients. In some cases, DFO, in the name of fairness or parity, closes all commercial, aboriginal and recreational Fraser River fisheries together, regardless of their differential impacts on stocks (see Case Study 9).

9.2.2 Regulation and Fees

Regulation of Anglers

DFO offers a variety of licences, with all licence fees subject to 7% GST. A Salmon Conservation Stamp ($6 plus GST) must be affixed to licences held by anglers wishing to retain salmon.

	Resident of Canada	Non-Resident
Annual	$21.00	$101.00
1-Day	$5.25	$7.00
3-Day	$11.00	$19.00
5-Day	$16.00	$32.00

Chinook limits are 2 daily, 4 possession, and an annual possession limit varying from 15 to 30 depending on the area. The combined catch limit for all salmon is 4 daily, 8 possession. Coho restrictions apply to many areas, for example, in 2003 only hatchery fin-clipped coho may be retained in Georgia Strait and only after July 1 (August 1 in 2002). Only barbless hooks can be used when fishing for salmon. The limit for halibut coastwide is 2 daily and 3 possession. There are special rockfish protection areas and limits.

BC has lower licence and salmon stamp costs than Alaska.

Compared to Alaska, the costs of licences and salmon stamps are generally lower and chinook limits are more generous, but other salmon and halibut limits are less generous in British Columbia (see Exhibit 32).

Regulation of Lodges and Charters

Lodges and charters are more heavily regulated in Alaska.

There is no specific regulation of fishing lodges and charters in BC other than those requirements that apply to businesses in general (e.g., a business licence), Canadian Coast Guard Safety regulations for vessels, and Transport Canada regulations for operators of vessels (forthcoming). In contrast, Alaska requires registration of fish guiding businesses and guides, licensing of vessels used by fishery guides, a US Coast Guard operator's licence ("6 Pack" licence), and random drug testing for guides. In addition, operators of saltwater guide vessels must submit weekly logbooks of catch and effort, with non-compliance punishable by a fine.

In BC, it appears that with the substantial decline in guides over the 1990s and increasingly stringent safety regulations, guiding has become more professionalized. Consumer confidence with respect to quality and safety of service does not seem to be out of step with other hospitality sectors. Furthermore, a review of the pros and cons of guide licensing conducted two decades ago found no compelling reason to license angling guides (Marvin Shaffer & Associates Ltd. *Charterboat and Guide Survey: Preliminary Policy Report*, 1981). In contrast, Peter Pearse recommended that businesses who provide vessels with guides for recreational fishing should be required to obtain a licence and licensees should be required to maintain a catch logbook (Peter Pearse, *Turning the Tide: A New Policy for Canada's Pacific Fisheries*, 1982).

Case Study 9: Recreational Fishing in the Fraser River and Tributaries

Background. In the early 1990s, the Fraser River was opened for sockeye, pink and chum salmon angling after being closed to fishing for these species since the 1950s. Also in the 1990s, coho started to withdraw from Georgia Strait and several restrictions were placed on angling in Washington State.

An Increase in Angling. As a result of increased opportunities in the Fraser River System and reduced opportunities elsewhere, there has been a large rise in recreational angling on the Fraser River mainstem and its major tributaries, the Vedder–Chilliwack and the Harrison. (It took some time for anglers to experiment and learn techniques to catch sockeye.) In particular, a large spike in activity takes place in the mainstem during the August run of sockeye through the system. Angling occurs from both boats and shore.

	Angler-hours	Harvest				
		Chinook	Sockeye	Coho	Pink	Chum
Fraser Mainstem (July - Aug)						
1986	214,900	3,600	0	100	0	0
1997	260,900	1,700	30,500	0	500	0
1999*	21,800	100	1,900	0	0	0
2002	343,800	3,700	122,900	0	0	0
Vedder-Chilliwack (Sept - Nov)						
1986	166,400	400	0	2,400	0	0
1998	291,000	12,700	0	6,200	0	4,300
2002	288,300	12,800	400	10,100	0	3,500

** River closed to angling for much of the period*

Source: DFO

The river fishing environment allows more selective angling targeted at specific stocks and species than is possible in many saltwater locations. That is, the river can be open to angling when saltwater areas are closed. In addition, the 1999 DFO Salmon Allocation Policy, which gave the recreational sector priority access over the commercial sector to chinook and coho, has helped spur angling activity in the region.

Abrupt Closures in Some Recent Years. Angling activity and success is predicated on run size, water levels, and regulatory clarity. In some recent years such as 1999, the Fraser River has been closed to sockeye angling, with no notice to anglers. This has impeded both guide businesses and independent anglers from planning their activities, and has had a severe impact on overall angler activity. In contrast, in 2002 there was a large run of sockeye and the river remained open to angling during the run's peak. The result was a record angler harvest of more than 120,000 sockeye in the Fraser River.

Other Advantages of River Angling. Angling in the Fraser system has other advantages over saltwater angling in that it is less expensive and, in the case of shore or bar fishing, can entail more of a social or family experience. The Fraser system is also easily accessible to the large and growing population of the Lower Mainland.

Guide licensing is not a BC priority, but can enhance catch monitoring.

However, as discussed below (Section 9.6), there is a need to improve the catch reporting of all sectors in the BC recreational fishery, including that of lodges and charters. Registration and/or licensing of guides can enhance catch reporting.

Alaskan authorities report that the registration and associated logbook program for guides enhances catch reporting for the angling sector – see Section 9.6 to follow. Alaskan authorities also indicate that state visitor and tourist bureaus often have links to the Alaska Department of Fish and Game (ADFG) guide registry on its website, a feature that promotes business development. Guide businesses showing a guide registration card typically receive a 10% discount, as a courtesy on their supply purchases from retail outlets.

Licence Vendors

Licence vendors are dissatisfied with the flat $1 commission paid by the federal government on all tidal angling licence sales – it does not adequately compensate for the time and effort required to process a licence purchase. As a result, several businesses have stopped selling tidal angling licences altogether, or refuse to accept credit cards for licence purchases (e.g., the transaction fee charged to the vendor by the credit card company on a $101 non-resident annual licence sale will exceed the $1 commission). The repercussion is reduced availability of licences to potential anglers and somewhat decreased angler participation.

9.2.3 Incentive Programs and Subsidies

No incentives have targeted the recreational sector since the late 1990s.

There are currently no subsidy programs directed at the BC recreational fishery and its lodge and charter components. Following DFO's conservation plan announcements in 1998, the federal government launched an adjustment and transition program for the commercial and recreational salmon sectors. The program for recreational businesses involved low interest loans to lodge and charter businesses. A total of 136 loans amounting to $6.1 million were provided based on applications made prior to May 15, 1999. Some sport fishing lodges and charters also received loans under the Fisheries Legacy Trust loan fund, another component of the federal adjustment program.

DFO provided funds of $3 -$4 million in the late 1990s to promote recreational fishing in BC. The former provincial agency Fisheries Renewal BC used to provide funding for a marketing program as well.

9.2.4 Federal-Provincial Cooperation

The two senior governments participate in a National Recreational Fisheries Task Group (NRFTG) formed three years ago under the Canadian Council of Fisheries and Aquaculture Ministers (CCFAM). The NRFTG's objectives are to promote recreational fishing, form partnerships and develop better ways to communicate with anglers. It is not clear what progress the Task Group has made.

The provincial government through the BC Ministry of Water, Land and Air Protection, the BC Ministry of Agriculture, Food and Fisheries and the former Fisheries Renewal BC and DFO have provided seed money and support to the Family Fishing Society of BC, a registered non-profit organization, to promote a family fishing weekend in June.

The results of federal-provincial cooperative efforts are unclear.

In the late 1990s, the provincial and federal governments, together with industry and other stakeholders, cooperated on a strategic planning exercise for the tidal recreational fishery (J Paul & Associates, *BC's Tidal and Anadromous Sport Fishery: Strategy* *and Action Plan*, 1998). The resulting report identified 18 proposed initiatives and 49 action items under three broad goals: sustained and restored resource use, enhanced recreational fishing experience and economic development. Little progress on implementing the action plan has occurred.

In 2001 DFO announced a new policy framework for recreational fisheries in Canada (DFO, "Recreational Fisheries in Canada: An Operational Policy Framework", 2001). The policy focuses on three themes – partnership, citizen engagement, and community stewardship – and creates five guiding principles:

- recreational fishing is a socially and economically valuable and legitimate use of fishery resources;
- DFO is responsible for providing sustainable recreational harvesting opportunities as part of integrated management plans;
- recreational harvesters have responsibility for shared stewardship for resource conservation and enhancement;
- mechanisms for federal/provincial cooperation in areas of shared jurisdiction will be established and strengthened; and
- DFO has a leadership role to coordinate policies/programs with the federal government which relate to recreational fishing.

BC is the only province or territory with separate licensing systems for freshwater and saltwater angling. The federal and provincial governments have had some discussion on the benefits of adopting a single, integrated licensing system.

In Alaska, ADFG has sole responsibility for management of both saltwater and freshwater angling. The Department's Sport Fish Division recently developed a strategic plan for its management of recreational fisheries (ADFG, *Division of Sport Fish Strategic Plan: Responsible Management of Alaska's Recreational Fisheries in the 21st Century*, 2003). The plan has a mission statement, four broad goals, 22 specific objectives, 122 key strategies, and 20 desired outcomes. Accountability is key to achieving its goals, so that a performance measurement system is an essential feature.

9.2.5 Government Funding of Recreational Fisheries Management

Recreational fisheries management is understaffed and underfunded in BC relative to Alaska.

DFO staffing of tidal recreational fisheries management comprises at most ten person-years. These positions include a Recreational Fishing Coordinator who has no staff reporting to him except an administrative person, a couple of fish licensing personnel in Vancouver, and two to four people in BC regional offices reporting to Area Managers. The current Recreational Fishing Coordinator is seconded each summer (peak angling season) to chair the Pacific Salmon Commission and its management of the commercial salmon fishery. The Department used to have a Sport Fishing Ombudsman, but this position was deleted in the late 1990s.

While recreational licence fees bring in $6 to $7 million annually to the federal treasury, these monies are deposited in the general Consolidated Revenue Fund and are not earmarked for recreational fisheries programs. DFO does fund a variety of recreational creel surveys that in total cost more than $1 million.

In Alaska, on the other hand, the ADFG has a formal Division of Sport Fish, established in 1951, with an annual budget of approximately $30 million. Nearly all these funds are derived from user-pay services, including the sale of fishing licences, stamps, and sport fishing-related equipment and fuel (subject to an excise tax). The Division is staffed by about 160 permanent full-time employees, with an additional 240 seasonal and temporary positions.

9.2.6 Aboriginal Issues

Despite increased aboriginal participation, land claim uncertainty has constrained industry investment.

Uncertainty over the resolution of aboriginal land claims has stifled investment in BC's lodge and charter sectors. In addition, some operators report attempts by aboriginal groups to charge a per guest "head tax," to allow the operator to guide guests in what is claimed to be traditional territory. This practice, as well, has reduced investment and, in some cases, has restricted the range of operations.

At the same time, the recreational fishery has seen the launch of several native owned and operated lodges, such as the Nisga'a lodge on the Nass River. Some operators have also been working with aboriginal interests to initiate joint ventures, hire local aboriginal workers, or incorporate an aboriginal theme or experience into their fishing packages.

9.3 *Human Resources*

Human resources are an important issue for all tourism, hospitality, and outdoor recreation sectors. Many lodge, charter, and angler service businesses, such as tackle shops and motels, are owner-operator or family businesses.

9.3.1 Labour Utilization and Wages

Recreational employment was 3,590 person-years in 2002, with wage earnings totalling $125 million.

Recreational fishing in tidal waters occurs year-round, although the peak activity period is May through September. Most of the jobs in the recreational fishery are seasonal. In 2002 the labour profile for the total industry was as follows:

	Jobs	Employment* (PYs)	Wages and Benefits ($ millions)
Lodges*	1,820	820	29
Charters*	750	300	10
Other	4,670	2,470	86
Total	7,240	3,590	125

** exclude jobs, person-years (PYs) employment and wages associated with angler expenditures that do not flow to the operator (included under "other").*

Hired guides in lodge or charter businesses earn $20 to $25 per hour. Guides at remote lodges, where the operator also provides room and board, make less. Certain high paying jobs, such as lodge manager and executive chef, provide higher earnings than guiding. In contrast, dockworkers and housekeeping staff at lodges earn substantially less than guides, and often the minimum wage of $8 per hour. Gratuities or tips can be a major component of the remuneration to lodge and charter workers, frequently amounting to one-third or more of regular wages.

9.3.2 Skilled Labour, Recruitment, and Training

As with most jobs in the tourism and hospitality sector, the work requirements are: the ability to work hard, have the right attitude and be attentive to customer service. During the short summer season, in some cases, there is competition with other seasonal employers for labour. Typically, lodge and charter businesses train their workers on-the-job.

In Campbell River, an experienced guide does teach a short introductory course on guiding, through the local community college. Lodges may sponsor staff to take First Aid, MED (Marine Emergency Duties), or tourism hospitality courses, if the course is directly related to the business.

Generally, recruitment and training are not a problem for angling businesses.

The summer season for guiding is a good fit for younger people, especially students, who like to fish. Some individuals guide in the summer and work in the ski business during the winter. It appears that there are no serious recruitment and training issues. Many lodges report that they have long-time staff who return every year.

However, lodges also report that they have experienced challenges in recruitment, training and the performance of former resource industry workers in adapting to a service industry. For this reason, some lodges prefer to use workers from Vancouver or Victoria, to staff field positions in their northern lodges.

9.3.3 Management and Labour Environment

There are no unions in BC's lodge and charter businesses. Negotiations over wages, benefits, and working conditions are an individual matter. There do not appear to be serious labour-management issues, in part because of the owner-operator and family nature of many businesses.

9.4 Investment and Financing of Lodges and Charters

9.4.1 Investment Levels and Viability

Investment Level

Lodges can require investment of 1.2 to 2 times annual revenues.

Very little information is available on the investment base in the lodge and charter sectors. Information from the Queen Charlotte Islands fishing lodge study (summarized in Case Study 10), and other sources suggests that the original cost investment typically ranges from 1.2 to 2 times annual revenues. Total lodge and charter revenues were estimated at $150 million in 2002, composed of $120 million for lodges and $30 million for charters. This implies an investment base of $180 to $300 million at original cost.

Viability

The financial targets for earnings on adequate return on investment are even more problematic. Again, the only reliable information is for the Queen Charlotte Island (QCI) lodge industry, where it appears the appropriate financial targets are 15% earnings before interest, taxes, depreciation, and amortization (EBITDA). This translates into a 5% profit before taxes but after interest and depreciation. The remote lodges need a relatively high (90%) occupancy level, due to the high share of fixed costs, such as air charter, in their cost structure.

Case Study 10: Queen Charlotte Islands Fishing Lodges – A High End Niche Product

The Setting. The Queen Charlotte Islands (QCI), or Haida Gwaii by their aboriginal name, is a pristine wilderness area. The region is sparsely populated, and is renowned worldwide for its magnificent vistas, unspoiled shoreline and position as the centre of Haida culture. Anglers can fish an abundance of large, trophy-size chinook and coho salmon, other salmon (pink, sockeye, chum), halibut, lingcod, and rockfish. Outstanding angling opportunities, combined with the magnificent setting, means that recreational fishing lodges can provide a world-class destination attraction. The high quality niche product allows lodges to charge in excess of $2,500 per angler for a 3-5 day fishing trip, which includes air transport from Vancouver, lodge meals and accommodation, fishing gear, boat and motor use, and access to a guide if desired. More than half of the lodge client base comes from outside Canada.

Profile. The QCI fishing lodge sector has grown since 1994 in terms of number of operations, client base, and revenues. Lodge revenues, at $38 million in 2002, were 67% greater than their 1994 level. Significant factors underlying the activity and revenue growth are the current healthy fish populations and DFO's 1999 Salmon Allocation Policy, which gave the recreational sector priority access over the commercial sector to chinook and coho.

Total QCI Lodge Sector	**1994**	**2002**
No. of Operations	13	18
No. of Overnight Clients	10,600	13,300
Revenues	$22.8 million	$38.0 million
Wage Bill and Benefits	$5.5 million	$9.3 million
Jobs	375	520
Employment Person-Years	180	245
Original Cost Investment	$32 million	$48 million
Local QCI Content		
Local Wage Bill	$0.3 million	$1.6 million
Other Local Expenditures*	<$1.5 million	$4.5 million
Local Jobs	35	115
Local Employment Person-Years	15	50

** Includes non-wage operating and capital expenditures.*

Local jobs and the local wage bill have tripled since 1994. Several lodges have made a concerted effort to hire local residents and to train some for management positions. Many of the local employees are aboriginal people.

The QCI lodges have cooperated with DFO for many years on a lodge logbook program and on the Haida Watchman Program to record angler catches. Co-management has been practiced.

Business Environment. There is modest potential for business growth, but occupancy levels already exceed 90%. The industry met its financial targets in 2002, which was probably the best financial year since 1994. However, the QCI lodge sector is still a high-risk, high cost industry that operates in a very competitive environment. It is also subject to regulatory and aboriginal land claims uncertainty and faces several daunting cost pressures (e.g., air charter, insurance), as well as the rise of the Canadian dollar against the US dollar in recent months.

Source: GSGislason & Associates Ltd., "The Queen Charlotte Islands Fishing Lodge Industry", 2003.

Financial targets of 15% and 25% of earnings before interest, depreciation, and taxes typify lodges and charters, respectively.

In 2002 the QCI lodge industry as a whole just exceeded these financial targets, but there was considerable variation in performance. For most lodges, 2002 saw the best business in several years. For lodges outside the QCI, we suggest that the operations just met their financial targets in 2002 (perhaps a higher 20% EBITDA since they would have lower fixed costs but also lower occupancy rates); that is, they earned a normal profit.

Charter operators typically need a 25% EBITDA, since their investment base is a higher multiple of revenue than many lodges. (A new 24-foot covered boat and motor can cost $40,000 or more.). The fishing charter industry coast-wide just met this target in 2002.

9.4.2 Access to Financing

Financing sources for the recreational fishery are wide-ranging.

There is a wide range of financing for lodge and charter businesses. Some operations are owned by forestry, retail or other concerns and rely on the parent company for financing. Most, however, are stand-alone businesses.

Some operators indicate that a proven track record and a viable business plan are enough to get non-recourse financing from banks, credit unions, or the Community Futures network. The latter lend on the basis of cash flow, rather than security. According to other operators, any business associated with the fishery, recreational or commercial, is perceived as high risk, such that lending institutions will not provide financing unless a home or other external asset is available as security.

9.4.3 Research and Development

Coordinated R&D efforts are limited.

The level of coordinated research and development for the recreational sector appears to be minimal. Industry participants are fiercely independent and reluctant to cooperate with one another on any level. Several tackle manufacturers on Vancouver Island have developed new products, exporting them throughout North America.

9.4.4 Overall Investment Climate

Considerable investment uncertainty remains.

The overall investment climate for lodges and charters is still tenuous, in spite of substantially better fishing in recent years. While investment prospects are much better than in the late 1990s, considerable uncertainty remains as a result of the potential for changes in government regulations and the lack of clarity surrounding land claims settlement.

9.5 Supply Chain Issues and Services

9.5.1 Resource Capability

The recreational fishery will be affected by the same resource and environmental issues as the commercial fishery, including application of the precautionary approach, global warming, the Wild Salmon Policy, and the Species at Risk Act (SARA). The priority access to chinook and coho by the recreational sector has helped immensely in at least two ways. First, it has provided more fish to anglers and allowed angling to continue when the commercial fishery for coho has been closed. Second, it has allowed lodges and charters to market this priority access to potential customers.

9.5.2 Other Goods and Services

Access to goods and services are generally not a constraint.

Apart from some specialized boating, equipment and bait distributors, the supply sector generally is not dedicated to the recreational fishery. Rather, it serves a multitude of customers. There are some custom fish processing facilities, such as St. Jean's in Nanaimo and SeaPak in Masset, that specialize in processing sport-caught fish (e.g., freezing, smoking, canning, vacuum packing). There appear to be no serious logistical issues except in isolated cases, such as accessing fuel in remote lodges.

9.6 *Catch Monitoring*

Catch Monitoring and Sustainability

Catch monitoring is a cornerstone of sustainable fisheries in today's environmentally conscious world. DFO has no formal system for estimating recreational harvest and effort (angler-days) on a coast-wide basis. DFO Pacific Region does not have readily available estimates of annual angler effort and harvests, for the whole coast, on its website or at its regional headquarters. This is especially a problem for shellfish and groundfish species.

DFO Pacific Region can produce in-house estimates from a combination of creel surveys, logbooks and judgement. However, these estimates do not necessarily cover all areas of the coast, all months and all types of angling (e.g., shore as well as boat-based angling), and, more importantly, they vary widely in precision and accuracy.

While the Georgia Strait Creel Survey has been ongoing since 1980/81, the survey procedures are not necessarily consistent from year to year. In addition, due to budgeting constraints, the monthly and geographic coverage has been curtailed in recent years. The survey also does not cover shore and pier-based angling. The survey does, however, provide useful trend information – see section 8.

Some of the logbook information is very good, such as that from the Queen Charlotte Islands lodge logbook program, but in many other cases the information is incomplete or suspect. DFO does not report on the coast-wide results of the logbook program – that is, the number of lodges or charters, response rate, harvest by species and angler-days.

DFO has no comprehensive system for reliably estimating angler effort, harvest, and releases on a coast-wide basis.

DFO Ottawa conducts a mail survey of recreational licence holders every five years, the last one being in 2000. However, the mail survey results for harvest are substantially higher than the DFO Pacific in-house estimates. DFO Ottawa and Pacific-Region do not agree on which is the more reliable source.

As well, none of these sources provides reliable estimates of released fish. Monitoring of the commercial fishery is moving towards monitoring total removals, including discards, through on-board observers or electronic monitoring programs. It is likely that there will soon be a need to provide reliable estimates of released fish for the recreational fishery, in order to address sustainability issues.

Catch Monitoring and Allocation

Formal allocation between recreational and commercial interests, as recently announced for halibut, requires rigorous and defensible catch monitoring for both interests. The commercial sector currently has a higher and more comprehensive level of monitoring for most fisheries than does the recreational fishery.

BC recreational harvests generally impact fish resources less than do BC commercial harvests. Nevertheless, the recreational sector still needs reliable catch monitoring to demonstrate that it is operating within its allocation targets and is operating sustainably. Catch monitoring requirements in the future for all fisheries sectors likely will be more stringent.

Licence fee increases are proposed for the recreational fishery, with the additional monies being directed to resource management, including better monitoring systems. However, under Federal Treasury Board policy it is very difficult to earmark any licence fees.

The Alaskan Situation

Alaska's catch monitoring system allows it to better gauge the sustainability of the fishery.

Alaska has a highly superior harvest monitoring system for its recreational fishery. The state has mandatory registration and logbook programs for saltwater fishing guides, and conducts targeted creel surveys.

Most importantly, for over 25 years Alaska has implemented an annual detailed (48-page) mail survey, with 20,000-plus completions, that provides reliable harvest information for several hundred regions/locations. The ADFG crosschecks the results of this detailed survey with creel survey and guide logbook program results. Substantial error checking and editing of responses occurs. Department ADFG biologists in the regions review the preliminary results as part of their core responsibilities. In short, the ADFG treats the recreational fishing survey as a very important component of its mandate and resource management activities.

9.7 Industry Liaison and Relationships

9.7.1 Industry Associations

Sport Fishing Advisory Board

Several industry associations represent angler interests.

The Sport Fishing Advisory Board (SFAB) provides advice to the Minister of Fisheries and Oceans on recreational fishing issues. The Board consists of commercial business interests as well as individual anglers not affiliated with a recreational fishing business. The latter form the majority. Both the federal government (DFO) and the provincial government participate. There are regional committees that report to the main Board.

The SFAB has worked closely and diligently with DFO on regulatory and policy issues. In fact, the SFAB model, with Northern and Southern Board components, is being copied by DFO in its recent overhaul of commercial salmon fishery advisory processes. The SFAB is effective because it represents all recreational interests and has the respect of governments.

Sport Fishing Institute

The Sport Fishing Institute (SFI) is an advocacy organization representing several lodges, charters, equipment and bait wholesalers, and other interests. In recent years, the SFI, through a partnership with DFO and the Province, has organized broad-based marketing campaigns related to the BC recreational fishery. The campaigns have included advertising, attending trade shows, and bringing in travel writers to BC.

In addition, during the last two years, the SFI has worked with Tourism BC and its regional representatives to design and disseminate advertising publications on saltwater and freshwater businesses.

The BC Wildlife Federation

Membership of the BC Wildlife Federation (BCWF) consists of 30,000 hunters and anglers in the province. Most of the latter are freshwater anglers. The BCWF is a conservation organization.

Local Associations

Several communities, such as Prince Rupert, Campbell River, and Victoria-Sooke, have local guide associations. There are also a variety of local angling associations or clubs that provide and maintain public boat ramps, undertake enhancement efforts, and promote special angling events.

9.7.2 Integration and Strategic Alliances

Strategic alliances among recreational businesses are limited, but increasing.

In general, strategic alliances among recreational fishing interests are few or weak, albeit growing. The small unsophisticated nature of many operations, often family-run, and the fierce independence of operators run counter to cooperation and partnerships among tourism businesses.

Some charter operations do work with bed and breakfast (B&B) operators or local motels to provide an all-inclusive package. As noted earlier, some operations are developing multi-experience packages that link with golf courses, spas, ecotourism operators, and aboriginal interests.

The recreational fishing industry is generally out of step with mainstream tourism marketing and businesses. The SFI notes that angling does not have a high profile in Tourism BC and other provincial tourism initiatives. However, as the joint SFI-Tourism BC advertising initiative shows, some progress is being made.

In addition, little interaction occurs between recreational and commercial fishing interests, despite the obvious commonality of interests and spillover effects between the two. Both sectors rely on access to and use of a publicly managed resource. As the events of the late 1990s demonstrate, issues that may seem far removed from the recreational fishery – notably, the debate over the Pacific Salmon Treaty and the outlook for the commercial fishery – can have profound effects on angler activity. More recently, some operators from North Vancouver Island report a few cancellations due to controversy over salmon farms.

Some progress is occurring. There is increasing coordination between recreational and commercial sectors on common issues such as aboriginal harvest agreements and proposed conservation measures. One QCI fishing lodge that promotes catch-and-release angling is purchasing salmon from commercial trollers, having it custom processed, and then providing the processed fish at no cost to its catch-and-release clients.

Under the *Sport Fishing Recreation Act*, US excise taxes imposed on fishing tackle and fuel are returned to states each year to improve fish habitat, public access to angling, and public education. The monies also helped develop the "Water Works Wonders" campaign to promote angling (see box).

"Water Works Wonders" – A National Effort in the US

The "Water Works Wonders" is a trademarked advertising campaign developed by the Recreational Boating and Fishing Foundation that can be personalized by federal or state agencies, manufacturers, retailers, tourism bureaus, industry associations and others to market angling as a recreational pursuit. The CD toolkit includes magazine, direct mail, newspaper insert, point-of-sale, Internet, television and other material that can be easily customized. Key messages such as a child's plea, "take me fishing", are targeted at seasonal and lapsed anglers, and at promoting a shared family experience. States such as Ohio and Oklahoma that have used the advertising campaign material have shown increases in licence sales.

9.7.3 Public Perception

There is little focussed research on the public's perception of saltwater or tidal recreational fisheries. However, the fact that over 200,000 angling licences are purchased annually by Canadian residents does indicate a significant interest in, and support for, the recreation activity. It is also noteworthy that many anglers and angler associations are the backbone of volunteer habitat improvement efforts along coastal BC.

Environmental issues are influencing public perceptions of the recreational fishery.

Nevertheless, the public perception of all BC fisheries, including the recreational fishery, can be influenced by environmental issues and debate. The drop in angler licence sales and participation of the late 1990s has abated, perhaps indicating an increase in support for tidal angling.

Part E. SWOT Analysis

10.0SWOT ANALYSIS

This closing section identifies and prioritizes the strengths, weaknesses, opportunities and threats facing the BC seafood and BC tidal recreational fishing sectors. The intent is to identify opportunities for strategic action by industry, governments and others to improve the sectors' competitiveness, viability and contribution to the provincial economy.

The section begins by summarizing the economic contribution of the various sectors. It then presents a number of themes that were pervasive throughout the study investigations, followed by the SWOT analysis.

10.1 Economic Contribution

The economic impact of the BC seafood and recreational fishery sectors must be assessed in a consistent, fair and credible manner.

10.1.1 Direct Economic Impacts

Exhibit 33 presents an economic profile of the 2002 BC seafood and tidal recreational fishery sectors, in terms of sales value, wages paid and employment. Each of the two seafood subsectors – the capture fishery and aquaculture – contains three components: harvesting or farming, processing, and retail and distribution.

Processing is integrated into the capture and aquaculture economic impacts.

Processing is displayed as an integrated component of the capture fishery and aquaculture, rather than as a separate sector. The reason is that food industries, of which seafood is one, are value chains that start with growing and/or harvesting of food raw material, proceed through several intermediate steps to add or preserve value, and conclude with the sale to final customers. Integrating processing in this way also helps prevent several common analytical errors, such as the double counting of seafood industry activity (e.g., by adding harvesting landed value to processing wholesale value) and inappropriate intrasectoral comparisons (e.g., comparing capture landed value to aquaculture processed value or recreational retail value).

The relevant valuation measure for each sector is the value of the product to final consumers if they reside in BC (retail value), or the value of the product when it leaves the province. For the capture fishery and aquaculture, processing and retailing margins are added to the landed or farmgate values. Angler expenditures are already consumer or retail expenditures and, therefore, need no adjustment.

Exhibit 33: Economic Contribution of BC Seafood & Recreational Fishing - 2002

	Seafood			Tidal	
	Capture	Aquaculture	Subtotal	Recreational	Total
Sales Value ($ millions)					
Harvesting and Farm Level	364	304	668	n/a	n/a
Processing Margin	396	84	480	n/a	n/a
Retail/Distribution Margin	110	57	167	550	n/a
Total	**870**	**445**	**1,315**	**550**	**1,865**
Wages & Benefits ($ millions)					
Harvesting and Farm Level	115	58	173	n/a	n/a
Processing	143	59	202	n/a	n/a
Retail & Distribution	49	26	75	125	n/a
Total	**307**	**143**	**450**	**125**	**575**
Employment (PYs*)					
Harvesting and Farm Level	3,410	1,730	5,140	n/a	n/a
Processing	4,035	1,655	5,690	n/a	n/a
Retail & Distribution	1,400	740	2,140	3,590	n/a
Total	**8,845**	**4,125**	**12,970**	**3,590**	**16,560**
Gross Domestic Product ($ millions)	**545**	**205**	**750**	**210**	**960**

** Person-years.*

Source: Estimates by GSGislason & Associates Ltd. based on: 1) this study; 2) BC Stats "British Columbia's Fisheries and Aquaculture Sector", September 2002; 3) Gislason et al., "The Economic Value of Salmon: Chinook and Coho in British Columbia", 1996; and 4) Gordon Gislason and Edna Lam "The Fishery of British Columbia: A Profile of Commercial Fishing Aquaculture and Recreational Fishing Sectors", October 1997.

Together, the seafood and tidal recreational fishing sectors make a substantial contribution to the BC economy.

2002 Activity	
Sales Value	$1,865 million
Wages and Benefits	$575 million
Employment	16,560 person-years
GDP	$960 million

Gross Domestic Product (GDP) is a measure of the unduplicated value of production of an industry or activity to the economy. It is equal to total revenues less the costs of materials and purchased inputs, and represents the gross return to capital and labour (BC Stats 2002).

The seafood and tidal recreational fishing sectors comprise about 1% of provincial GDP and employment. Since 1996 employment in aquaculture and recreational fishing has grown, while there has been a decline in capture sector employment.

	Employment (PYs)		
	Capture*	Aquaculture*	Recreational
1996	10,285	1,690	2,870
2002	8,885	4,125	3,590

* *Includes harvesting, farming, processing, and distribution and retail.*

The 1996 figures come from a report prepared for Fisheries Renewal BC (Gislason and Lam, 1997).

10.1.2 Regional Employment

A large share of employment is in BC's rural communities.

Exhibit 34 presents a regional breakdown of the direct employment derived from the BC seafood and tidal recreational fishing sectors. About 45% of total employment occurs outside the major metropolitan areas of Greater Vancouver and Greater Victoria, which together comprise 60% or more of total provincial population and employment.

The seafood sector and recreational fishing provide a major share of their job benefits in rural communities that are affected by downturns in other resource-based industries, such as forestry. These communities have few alternative economic development opportunities outside the fisheries, aquaculture, and other marine sectors.

Exhibit 34: 2002 BC Seafood and Tidal Recreational Fishing Employment PYs*

	Seafood			Tidal Recreational	Total
	Capture	Aquaculture	Subtotal		
Region					
Queen Charlotte Islands	105	0	105	100	205
North Coast	1,000	0	1,000	220	1,220
Central Coast	115	60	175	65	240
North Vancouver Island	335	1,150	1,485	210	1,695
Mid Vancouver Island	855	1,330	2,185	615	2,800
South Vancouver Island	570	95	665	255	920
West Coast Vancouver Island	440	400	840	490	1,330
Victoria and Area	455	75	530	415	945
Sunshine Coast	265	165	430	110	540
Lower Mainland and Other	4,705	850	5,555	1,110	6,665
Total	8,845	4,125	12,970	3,590	16,560

Note: 1. Estimates are approximations.

2. Employment is the sum of harvesting/farming, processing, retail, and distribution.

3. PYs are person-years.

4. Region is place of residence and not necessarily the location where the activity occurs.

Source: GSGislason & Associates Ltd. estimates.

10.2 Themes

During the study interviews and investigations, several themes recurred with respect to the challenges and opportunities facing the BC seafood and tidal recreational fishing sectors. These themes are outlined below, along with some sample comments from the interviews and research. (The themes are not prioritized.)

10.2.1 General

Theme #1: **The world has changed and the BC seafood and recreational fishing sectors need to change with it. By adapting, industry can prosper; otherwise it will wither and fail to reach its potential.**

The late 1970s through the early 1990s were a good period for the BC seafood industry, characterized by: 1) favourable oceanographic conditions; 2) exclusive access to existing stocks within Canada's 200 nautical mile Exclusive Economic Zone, declared in 1977; 3) favourable exchange rate movements; 4) growing world economies, especially in Japan; and 5) strong global demand and prices for seafood. The BC recreational fishery was also able to expand to the next resource frontier: the West Coast of Vancouver Island, the Queen Charlotte Islands, and the North Coast.

These favourable conditions have since disappeared or reached maturity. The world aquaculture sector has grown dramatically over the past 20 years, greatly increasing the global supply of seafood and affecting world seafood markets. Successful businesses and industries are those that can adapt and reposition themselves in the face of changing circumstances. Both the seafood and recreational fishing sectors must do so in order to respond to new challenges and opportunities.

Sample comment: *Product differentiation is key; anybody in the commodity business is dead.*

Theme #2: **Leadership, accountability, and relationship and trust building are essential, within and between industry and government.**

The modern food industry requires coordination between the different levels of the value chain to meet the needs of final consumers. Harvesters/growers, processors, distributors, and retailers must cooperate to satisfy the availability, quality, and price parameters of individual market segments.

Given the importance of government regulation to industry fortunes, there is also a need for productive dialogue between industry and government. This would be much facilitated by an effective industry association speaking with one voice for each major sector, and by government departments viewing economic considerations as part of their mandate and service delivery.

Sample comment: *Risk and uncertainty are inherent parts of any business. We need people to make decisions and to take responsibility for their decisions.*

Theme #3: **Aboriginal issues, including land claims, create substantial uncertainty and business risk and stifle needed investment.**

Claims settlements would reduce uncertainty with respect to Crown land tenure for aquaculture and tourism businesses and with respect to licence policy, allocation, and security of resource access for both the capture and recreational fisheries. Settlements could also stimulate business opportunities for both aboriginal and non-aboriginal interests.

Sample comment: *To compete you need to invest. Existing industry is not investing in its future.*

Theme #4: **The whole is larger than the sum of its parts. Each sector has a legitimate claim to existence; sector bashing gives mixed messages.**

There is broad public support for the BC seafood and recreational fishing sectors, as evidenced by the substantial numbers of Canadians who eat BC seafood and/or fish recreationally in BC. However, in recent years, the public increasingly views fish and fishing as environmental issues or the subject of fractious controversy, instead of the foundation of a food business and of an outdoor recreation activity.

The controversies have resulted in several false assertions, dampened demand in some markets, and sent government mixed signals as to needed regulatory action (resulting in government inaction on several fronts). They have also wasted the attention of industry senior management and stalled industry strategic planning at a time when the competitive landscape is shifting rapidly.

Sample comment: *For your individual sector to be healthy, you need all sectors to be viable.*

Theme #5: **The environmental ethic is growing worldwide, with major implications for the capture fishery and aquaculture.**

This change is evidenced by the Marine Stewardship Council (MSC) certification process for sustainable seafood and the growing influence of environmental organizations on fisheries management decisions.

Environmental sustainability requirements affect both supply and demand. Without demonstrable sustainability, the BC capture and recreational fisheries and the aquaculture industry will not be allowed to operate, or will have their operation severely limited. Buyers, increasingly, are instituting sustainable sourcing policies for seafood, particularly in Europe. For seafood and recreational fishing sectors to be sustainable economically, they must be sustainable environmentally.

Sample comment: *Consumers are asking more questions as to where and how the fish are caught.*

Theme #6: **The federal Species at Risk Act (SARA) will have a major impact on particular fisheries.**

The protection of wild species under SARA may seriously impact capture fisheries through closures and other restrictions where endangered stocks are mixed with strong stocks. In particular, the Johnstone Strait and Juan de Fuca Strait sockeye fisheries may face severe restrictions to protect Cultus Lake sockeye and Sakinaw Lake sockeye.

Sample comment: *Industry should not underestimate how profound the fisheries management changes will be under SARA.*

Theme #7: **Government regulation of the BC seafood and recreational fishing sectors is considerable, as it should be. At the same time, regulation and policy actions should be efficient, timely and prudent so as not to inhibit business planning and operations.**

Government has an important regulatory role given industry use of the public marine environment and human health and safety issues. However, private sector businesses need to plan operations, raise capital and financing, develop markets and products, and invest in research and development and human resources. To a significant extent, the tardiness and perceived capriciousness of government decisions inhibits these essential business operations.

Sample comment: *Preservationist-thinking overtook DFO in the late 1990s. Industry can live with bad decisions, but it cannot live with no decisions.*

Theme #8: **Government must focus on what needs to be done rather than on who should do it. Although the federal government has paramount regulatory responsibility for fish harvesting and tidal angling, the Province can still play an important role.**

It is important first to identify which actions and policy initiatives are advisable and then to decide cooperatively who should lead the action or initiative. There is a need to coordinate and harmonize federal and provincial requirements and actions.

The Province can and should influence the federal government on a variety of business issues, including the need for management reform of the capture fishery to improve industry viability and to pursue market opportunities, and the requirement for much better marketing of both seafood and recreational fishing opportunities.

Sample comment: *We need to stop looking at fisheries and their problems from a jurisdictional perspective.*

10.2.2 Seafood Sector

Theme #9: **BC seafood competes in the global food industry. The seafood sector faces much greater competition from globalization and the growth of aquaculture.**

BC seafood products must compete with seafood from other countries and with other protein sources, such as poultry, pork, and even soy. The seafood industry should emphasize the "food" component of "seafood".

Advances in refrigeration and transportation technology mean that seafood processing no longer needs to occur in close proximity to the growing or harvesting location. Substantial consolidation in food distribution and retailing has put price pressures on food manufacturers and their suppliers. Formal tariffs have decreased on many food items with several international trade agreements. The result is greater competition.

Sample comment: *We need to impose the discipline of food manufacturing on the seafood sector.*

Theme #10: Consumer tastes and preferences are changing. BC needs to adapt to the demands of the market and meet customer needs, rather than focussing on the resource. Industry must be market-driven instead of production-driven.

Among consumer trends are greater attention to a healthy diet, which includes seafood and a desire for more convenience in food products (e.g., "meal-ready" products). More people are eating in food service restaurants.

Seafood today is a "buyers market", not a "sellers market". The key to success in most businesses is to understand customers' needs, shape product offerings so that they match those needs, and aggressively market the products to potential customers. Most businesses succeed based on marketing prowess and not on production capability.

Sample comment: *Marketing is an aggressive blood sport. We need to get much better at it.*

Theme #11: Competing in the global food business requires cooperation throughout the value chain to meet consumer needs.

Customers expect and demand a consistent supply of good quality, nutritious food at a competitive price throughout the year. Meeting these needs requires communication, cooperation, and coordination of the different players in the value chain.

For example, at an arranged time a known number and weight of live poultry will be delivered to the poultry processing plant, where the birds are slaughtered, bled, processed, graded, and packaged into a variety of consumer products. These products then move through distribution channels to fill pre-specified retail and food service orders. This is the business model against which the seafood industry competes.

Sample comment: *In the food business, you need cooperation between production, processing, and marketing. You need single messaging from industry to government.*

Theme #12: As a high-cost, low-volume producer, BC must press its advantage in quality. Quality means different things to producers and consumers.

The province and Canada as a whole have relatively high wage rates, and more stringent environmental and health and safety standards than most of their international competitors. Consequently, their production costs are higher. In low-value, labour-intensive commodity markets, BC has difficulty competing.

BC's potential advantage in seafood – both capture and farmed – is the high quality of the food product when it leaves the cold, relatively pristine marine environment. The nearshore fishing fleet and the farmed finfish and shellfish sectors can provide high quality products to major markets in the US and Southeast Asia in a timely manner.

For many seafood producers, quality is synonymous with meeting regulatory standards on health and safety, such as Hazard Analysis and Critical Control Point (HACCP) standards, to ensure that the seafood is safe to eat. Customers, however, see safety as a minimum requirement, with true quality entailing a myriad of factors, such as shelf life, taste, appearance, and packaging. The seafood business needs to understand quality from its customers' perspectives and then deliver it. The global aquaculture seafood sector has raised quality expectations for the global capture seafood sector.

Sample comment: *We should be a high-end producer and not a commodity producer. Our cost structure is too high.*

Theme #13: Traceability is becoming a business requirement.

Without demonstrable traceability, BC seafood producers will not be able to access an expanding sphere of markets. Traceability is a growing market requirement. For the capture fishery, it is inexorably linked with selective fishing and catch monitoring from "sea to table".

Traceability is difficult, if not impossible, to demonstrate without credible catch monitoring. While inevitably adding to costs, it also creates market and product development opportunities by slowing down the harvest and enhancing the identification of different quality products through the value chain.

Sample comment: *The pressure is on, especially in Europe, to be able to trace a product back to its source – not just the plant, but back to the individual vessel or farm.*

Theme #14: Human resource issues are pending and require immediate attention.

By and large, a training culture does not exist in the BC seafood industry. Most training, where it occurs, is on-the-job rather than institutional. The institutional training that does exist focuses on production techniques, rather than marketing and business skills. Some exceptions can be found, for example in the newer farmed salmon processing plants. Institutions in Eastern Canada, the European Union, New Zealand, and many other regions do a better job than BC institutions of training seafood industry workers.

The workforce on BC boats and in processing plants, especially wild fish plants, is aging. Today's vessel and plant operations require knowledge of more sophisticated equipment and electronics. Tomorrow's workers will need improved skills and knowledge to meet emerging sustainability and traceability challenges.

Sample comment: *Our workforce is old. For any job with a skill attached to it, we are in trouble in the wild business.*

Theme #15: Wild salmon and its problems dominate discussions of the capture fisheries.

The discussions and analysis during the course of this study suggest that the non-salmon capture fisheries of herring, groundfish, and shellfish are operating reasonably well. They are viable and generally market-driven; their fisheries organizations have strong and constructive relationships with DFO, processors, and others; and there is a degree of trust among individual fishermen, processors/buyers, and DFO.

The BC salmon fishery has none of these characteristics. The four barriers – a lack of viability, an inability to meet market needs, ineffective industry organizations, and insufficient cooperation and trust – are related; they are linked by the inadequacy of the current management regime for salmon. This competitive fishery system does not foster the appropriate incentives, enlightened self-interest, and cooperation needed to operate successfully in the global seafood industry.

Sample comment: *Peoples' perceptions of fisheries are coloured by salmon.*

Theme #16: **Both the capture and aquaculture sectors would benefit from cooperating with one another.**

The general food consumer is often unsophisticated and susceptible to mixed messages from attack advertising. Many consumers who hear attacks on farmed salmon, for example, will receive the message that it is bad to eat seafood and bad to eat salmon.

The capture and aquaculture sectors could work together to expand the overall market and attract new consumers for all seafood. The farmed finfish sector also has year-round distribution channels for fresh seafood – channels completely different than those for canned, roe, or frozen whole products – that potentially could also be used to market high-quality fresh capture seafood as niche specialty products.

Sample comment: *Distribution systems for fresh farmed salmon could serve as a model for distributing quality wild salmon.*

10.2.3 Recreational Sector

Theme #17: **Recreational fishing in BC competes with angling opportunities elsewhere and with other forms of outdoor recreation in North America.**

Competitors of BC angling include other angling providers, such as Alaska, as well as non-angling alternatives, such as golfing, ecotourism, and other passive recreational pursuits. Our healthy fish stocks and enviable wilderness setting draws anglers from throughout North America and around the world.

Sample comment: *Our corporate lodge client could go to a golf resort next year.*

Theme #18: **The lack of attention and financial resources devoted by DFO to the recreational fishery is a major problem.**

The lack of profile and resources devoted to the recreational fishing section within DFO inhibits industry planning and recognition. For example, improved catch monitoring for the recreational fishery is needed in today's era of sustainable fisheries and selective fishing practices. However, it is currently hampered by DFO's low commitment to recreational fisheries.

Sample comment: *DFO is so understaffed and underfunded on the recreational fisheries front that it borders on tokenism.*

Theme #19: **The recreational sector has weak linkages to the broad tourism sector and tourism marketing programs.**

The outdoor recreationist has a multitude of activity options and may combine several activities on a particular trip. Stronger linkages of angler-businesses to broad-based tourism associations such as Tourism BC are warranted to facilitate marketing.

Sample comment: *The recreational fishery should forge closer links to Tourism BC.*

Theme #20: **It is unclear where the next generation of anglers will come from.**

The BC population is increasing but per capita participation in angling is decreasing. Urban populations represent a potential angler pool but the industry needs to promote awareness of and educate the public about angling opportunities.

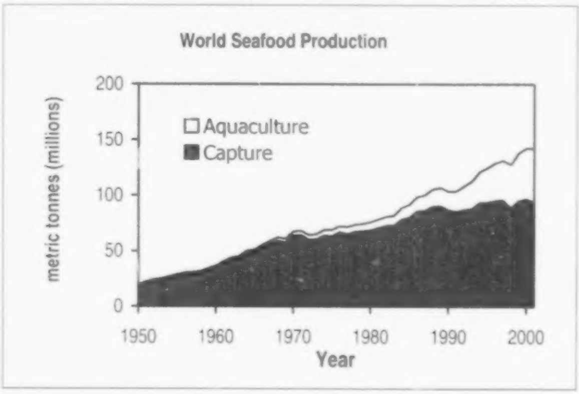
Sample comment: *There is a huge potential to cultivate and recruit the urban angler, but lack of awareness of opportunities is a problem.*

10.3 Major Business Issues

10.3.1 Market Trends and Requirements

Seafood

World seafood production grew from 100 million tonnes in 1987 to 142 million tonnes in 2001, consisting of 94 million tonnes from the capture fishery and 48 million tonnes from aquaculture. Global production is expected to rise by another 20 to 30 million tonnes by 2020. Essentially, all of the growth since the late 1980s and all projected future growth are attributable to aquaculture.



Seafood is now a global food business, with processing locations no longer necessarily tied to the location of harvest or growing. For example, technological advances and low wages in Southeast Asia (e.g., $1 US per hour in China) make it cost-effective to ship frozen fish to Asia for further processing and then distribution around the world.

Significant consolidation at the food distribution and retail levels has occurred. Large discounters (e.g., Costco) and broadline distributors of a variety of proteins (e.g., SYSCO) have emerged, and the balance of power has shifted from food manufacturers to retailers. The result is now severe price and margin pressure on manufacturers.

There is much greater competition for "centre of the plate" protein among seafood, red meat, poultry, soy, and other products. In the food industry, producers, processors, and distributors cooperate to deliver "consumer value," meaning products that deliver the availability, price, and quality attributes desired by consumers.

Consumer trends include the shift to a more healthy diet, convenience ("meal ready") products, and increased concern about food safety, especially after the BSE ("mad cow" disease) incidents and terrorist attacks. Traceability – the tracking of food from harvesters or growers along the value chain to the final consumer – is increasingly becoming a requirement for market access. Potential European buyers are sending inspectors to BC fish processing plants to gauge procedures.

Seafood consumers generally prefer fresh to frozen seafood. Fresh fish distributors indicate a preference for fresh fish that is bled, with no belly cuts, layer-iced, and delivered no later than 72 hours after slaughter. Bleeding typically doubles shelf-life. While the aquaculture sector can meet these specifications, the wild fishery and processing sector have difficulty doing so. (Farmed salmon production techniques have been modelled after the poultry industry, including the delivery of live animals to the plant, bleeding and other practices.)

Niche markets also exist for live and whole seafood products of the highest quality. Examples include geoducks (Hong Kong) and live oysters and rockfish (specialty restaurants in the Pacific Northwest). The value derives not from cutting and/or processing the product, but rather from handling, refrigeration, packaging, and transport to preserve its pristine quality following harvesting.

Sustainability and eco-labelling are gaining importance as desirable market attributes, particularly with the Marine Stewardship Council (MSC) certification process. Unilever has indicated that by 2005 it will buy only fish from sustainable sources. Alaska salmon is MSC-certified, and BC salmon is currently in the review process. Both BC and Alaska halibut are also in the MSC review process.

The Japanese seafood market, traditionally the most discerning and highest quality, has been transformed with the weakness in Japan's economy, a shift in consumer tastes of younger people away from seafood towards red meat, and the influx of farmed salmon and other seafood. These changes, along with exchange rate movements, have reduced prices for BC salmon and herring roe exports to Japan.

Canadian seafood exporters benefited during the late 1990s from the weak Canadian dollar relative to the US currency. With the dollar's recent strengthening, this advantage has disappeared, since revenues are denominated mainly in US dollars.

Tidal Angling

A total of 2.1 million angler- days were fished in BC in 2002, comprising 1.65 million days of boat-based angling and 0.45 million days of shore-based angling. The vast majority of this activity was conducted by BC residents, who on average fish twice the days of non-residents. Alberta and Washington State are the source of most out-of-province anglers. The shares of anglers fishing from shore and anglers using lodge services have been rising.

Immigration, an aging population, and urbanization have all contributed to reduced angling by BC residents. BC fishing lodges and charters face competition for the outdoor recreationist tourist dollar from other saltwater angling (mainly Alaska), freshwater angling, and other outdoor recreation such as golf and ecotourism.

BC's advantages are relatively healthy fish populations, a pristine marine environment, and low costs. The strengthening Canadian dollar is a challenge to the lodge, charter, and other businesses that cater to US anglers. Increasingly, provincial operators are packaging angling products to diversify their client base.

10.3.2 Government Policies and Regulations

Seafood

The main regulatory challenge in the wild harvesting sector is to reform the management of the salmon fishery. There is a strong need to abandon the competitive fishing format and to provide incentives to slow down the harvest so as to realize better quality and value from the fish. A major impediment to change is the lack of an effective salmon harvester association representing the majority of licence holders. Without such an organization, DFO does not know with whom to consult and negotiate.

There is substantial uncertainty of access in harvesting. Uncertain access or tenure is tied to treaty and Aboriginal Fishing Strategy issues, especially the controversial Pilot Sales Agreements under the Aboriginal Fishing Strategy (AFS). However, uncertainty of access relates not only to aboriginal matters.

The fact that fishing licences and/or quotas represent limited fishing privileges and not property rights *per se*, together with the unfettered discretionary authority of the federal Minister of Fisheries and Oceans, means that true certainty of access to the resource is not possible for harvesting. Industry maintains that the lack of certainty shortens the business planning horizon, prevents financing of operations, and diminishes business value.

The aquaculture industry is subject to more than 50 separate federal, provincial, and regional regulatory processes governing land use and development. A key concern is the federal CEAA screening and approval process for new and renewed farm sites. These reviews can take two years or more. The lack of timely approvals stymies industry growth, puts individual companies in dire financial straits, and eliminates employment opportunities for economically disadvantaged coastal communities.

The Codes of Practice for farmed salmon and shellfish operations, developed by industry and the provincial government, will raise standards and performances, comply with applicable laws and regulations, and ensure that farming practices meet objectives for environmental sustainability.

Tidal Angling

The 1999 DFO Salmon Allocation Policy gave the recreational sector priority access over the commercial sector to chinook and coho salmon, and the commercial sector primary access to sockeye, pink, and chum salmon. This policy has helped the recreational sector immensely. Not only has it provided more salmon, but also industry has been able to market the policy as a selling point to prospective clients. Recently, DFO announced a recreational sector 12% catch "ceiling" for the combined commercial-recreational harvest of halibut.

The regulatory uncertainty that presided over the industry in the late 1990s has abated to a large extent. In recent years, DFO has given early signals to the recreational fishing sector that catch limits and angling opportunities should remain stable.

10.3.3 Human Resources

Seafood

The workforce of the capture seafood sector, on boats and in plants, is aging and characterized by generally low levels of education and formal training. It does not necessarily have the skills, or the ability to retrain, to meet the demands of today's food industry. Moreover, wage rates in BC fish processing plants are higher than those in East Coast Canadian facilities.

The BC farmed salmon industry does recruit trained and skilled workers to work at the farm site. However, many of these employees come from East Coast institutions (e.g., the Marine Institute in St. John's), since the breadth and duration of aquaculture training at BC institutions does not meet industry needs or standards. The provincial farmed shellfish workforce is mostly untrained. Productivity at shellfish farming sites could be increased substantially with greater worker diligence and knowledge.

Unlike the European seafood sector, BC industry does not have a strong training culture. As market demands shift to increased health and safety, traceable and sustainable production techniques, and new product development, the provincial seafood workforce will become a liability to international competitiveness.

Tidal Angling

Fishing lodges and charters form part of the tourism and hospitality sector. Typical of tourism industries, most lodge and charter businesses train their own workers on the job.

There do not appear to be any serious human resource recruitment or training issues for the recreational fishery. However, some northern operators report difficulty in instilling a service mentality in local hires, with the result that they frequently turn to workers from Vancouver or Victoria to staff field positions. Other operators have established joint ventures with local interests, often aboriginal, and have a substantial number of local hires in their workforce.

10.3.4 Investment and Technology

Seafood

The market value of investment in the BC seafood industry is approximately $3 billion, including $2.1 billion in the harvesting sector, of which 85% is in licences and quota. In 2002, the seafood processing, aquaculture, and salmon harvesting sectors did not meet EBITDA (or Earnings Before Interest, Taxes, Depreciation, and Amoritization) revenue targets, while the herring, groundfish, and shellfish harvesting fleet segments did. It is clearly a priority to improve the financial performance of the industry as a whole.

BC Seafood Financial Measures 2002

Sector	Asset Value ($ billions)	Revenues ($ billions)	EBITDA Target (%)
Harvesting	$2.1	$0.36	40%
Aquaculture	$0.4	$0.30	15-25%
Processing	$0.4	$1.15*	10%

** includes harvesting and aquaculture revenue but excludes retail/distribution margins*

Various research and development initiatives are underway for the aquaculture sector, including the development of new vaccines, closed containment systems, and new species development. Significant potential exists to transform seafood plant waste into fish silage, fishmeal, and nutraceuticals and pharmaceuticals.

Promising new seafood preservation technologies being used around the world include Modified Atmosphere Packaging (MAP), ozonated water, and the sedative aqui-s for live fish shipments. However, these technologies have not been approved by the Canadian Food Inspection Agency (CFIA) for use in Canada.

The overall investment climate is generally poor, largely due to poor financial performance, unfavourable currency fluctuations, uncertainty related to aboriginal issues, and regulatory hurdles and delays in aquaculture.

Tidal Angling

The year 2002 was a good one for the BC tidal recreational fishing sector. In general, businesses such as lodges, charters, marinas, tackle manufacturers, and other suppliers had satisfactory financial performance. Nonetheless, the investment climate remains tenuous due to land claims uncertainty and the potential instability of regulations.

10.3.5 Supply Chain Issues

Seafood

Apart from the fish resource (see below), no serious supply chain issues face the wild fishery. With respect to aquaculture, BC has very good biophysical capability to grow both finfish and shellfish. Aquaculture production could potentially expand fivefold or more.

The BC farmed salmon industry has a competitive disadvantage relative to Chile and other world suppliers, given its high cost of smolt production. This reflects a reliance on land-based tank systems, due to difficulties in accessing lakes for more cost-effective rearing. The BC shellfish industry is also vulnerable because of its dependence on Washington State for the majority of its oyster and clam seed requirements.

There are currently no finfish feed supply issues. However, growing demands for forage fish, a key component of feed for global aquaculture, may drive up feed prices and spur conversion to more vegetable-based feeds. Two-thirds of the world's fishmeal is used in feed for poultry, pigs, and other animals. Terrestrial farmers have greater latitude in choosing feed composition for these animals, and would likely be the first to move to alternative sources.

Tidal Angling

No supply chain issues apply to tidal angling. In fact, several tackle manufacturers on Vancouver Island have developed new products, exporting them throughout North America.

10.3.6 Resources and the Environment

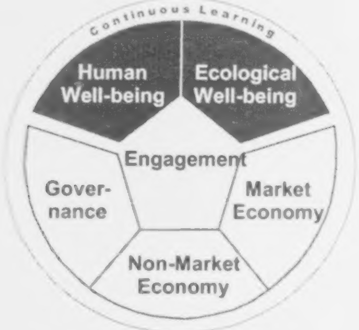
Seafood

The majority of wild fish stocks are "healthy". Some have a "mixed" status, including coho salmon, lingcod, and shelf/slope rockfish. Most species are fully exploited with the notable exception of salmon which has been managed very conservatively in recent years. Current salmon harvest rates of 20% to 40% are much lower than their historical range of 60% to 80%, and most stocks have rebuilt over the past five years or are at historic abundance levels.

Substantial progress has been made on sustainability and selective fishing practices in BC, through measures such as 100% Dockside Monitoring Programs (DMP) for Individual Quota (IQ) fisheries, observer programs, conservative fishing quotas, the re-siting of problem fish farms, codes of practice developed by the aquaculture sector, and effective co-management. Mandatory dockside monitoring is a condition of licence for all groundfish and herring fisheries. Challenges remain with respect to discards at sea, species that have no quota catch ceilings, and improved co-management.

The lack of Paralytic Shellfish Poison (PSP) testing facilities is a constraint to shellfish fisheries development on the North Coast. How an experimental new and emerging fishery can graduate to full commercial status is uncertain. Major impediments to implementing new and emerging fisheries are the cost of basic research, administrative complexity, and timely DFO decision-making. Other uncertainties surround the impact of changes in the ocean environment – El Nino, La Nina, and decadal scale cycle effects – and climate change on fish stocks and fisheries.

Sustainability encompasses both environmental and economic objectives. While BC has made progress towards sustainability of the capture fishery, challenges remain. Given the data deficiencies in most fisheries, the precautionary approach is an essential tool for sustainable fisheries management. It allows fishing to occur while more information on resource status is assembled.



Source: *International Institute for Sustainable Development 2002*

There is considerable confusion in the minds of the public, environmentalists, and some fisheries managers as to the true meaning of the precautionary approach and the far more restrictive precautionary principle. Under the precautionary principle, the threat of serious or irreversible damage results in a ban on fishing, even though there may be considerable uncertainty due to incomplete knowledge.

The *Species at Risk Act* (SARA), which came into force in June 2003, could have major impacts on how fisheries are managed and conducted. A number of BC salmon stocks have been designated as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). If these stocks are listed under SARA, recovery plans for them could severely affect mixed stock salmon fisheries.

The Wild Salmon Policy currently under development could also significantly impact fisheries management in BC. One of its objectives is to avoid the listing of species under SARA by facilitating action in advance of a conservation crisis.

The farmed salmon industry faces a variety of environmental issues, some potentially valid and in need of further investigation (e.g., Infectious Hematopoietic Necrosis or IHN, sea lice), and others based on a lack of understanding or misinformation that requires correcting (e.g., animal waste, fishmeal use, pollutants in feed, carotenoid use, antibiotics, drugs). Research is underway on the outstanding issues.

All farmed fish and shellfish go through a federally (CFIA) registered plant. The Canadian Shellfish Sanitation Program (CSSP) and other measures provide greater traceability for aquaculture compared to the wild fishery. Nevertheless, a HACCP-based Farm Food Safety program is being planned for shellfish and finfish aquaculture to provide traceability back to the farm site equivalent to that for terrestrial agriculture.

Tidal Angling

The recreational fishery is affected by the same resource and environmental issues as the commercial fishery, including the application of the precautionary approach, climate change, the Wild Salmon Policy, and SARA.

10.3.7 Catch Monitoring

Seafood

Catch monitoring is a cornerstone of sustainable fisheries in today's environmentally conscious world. All of BC's IQ fisheries and herring fisheries have strong dockside monitoring, where 100% of the harvest is validated at landing. Several IQ fisheries also have observer coverage or electronic monitoring to track bycatch and at-sea discards.

Non-IQ fisheries such as salmon, shrimp trawl, and prawn trap do not have dockside monitoring. Rather, a myriad of sales slips, logbooks, hail, and other measures are used. Some of these non-IQ fisheries including salmon have some level of observer coverage. (The crab fishery has electronic monitoring of catches.)

The catch monitoring systems for commercial salmon fisheries, especially the commercial aboriginal in-river components, require substantial improvement. That is, as with co-management in general, the catch monitoring programs for IQ fisheries are more advanced than for non-IQ fisheries.

Tidal Angling

DFO has no formal system for estimating recreational harvest and effort (angler-days) on a coast-wide basis. DFO Pacific Region does produce in-house estimates from a combination of creel surveys, logbooks, and observations by DFO staff. However, these estimates do not necessarily cover all areas of the coast, all months, and all types of angling (e.g., shore as well as boat-based angling); moreover, they vary widely in precision and accuracy.

10.3.8 Industry Liaison and Relationships

Seafood

An important feature of the food industry is cooperation between different agents in the value chain to produce the desired food product for the consumer. Unfortunately, BC seafood has historically been characterized by fractiousness and mistrust within and between the harvesting and processing sectors. While the farmed finfish sector does cooperate substantially – in large part due to the vertical integration of most growout and processing operations – farmed shellfish is also fragmented. Given the important regulatory role of government, BC seafood probably needs more cooperation than most food industries and a single voice to deal with high-level issues.

Some improvements are being made, particularly through harvester associations in IQ fisheries and the creation of the BC Seafood Alliance. With the oversight provided by environmental organizations and the need for value chain cooperation to remain competitive, all elements of the seafood sector must have strong, coherent industry associations.

Seafood industry segments also need to strike strategic alliances, horizontally and vertically. Again, some progress is occurring, for example, the Fisheries Council of Canada, Salmon of the Americas, and the world market perspective provided by multinational salmon farming companies.

The public image of the seafood industry has been affected by the often acrimonious relationships and conflicts that flare up in full public view, and the industry's inability to counteract negative environmental press while responding to legitimate environmental concerns.

Tidal Angling

The Sport Fish Advisory Board (SFAB) has provided strategic advice to the Minister of Fisheries and Oceans on a wide range of topics. The SFAB is effective because it represents all recreational interests and has the respect of governments.

10.4 SWOT Results

SWOT is a planning tool used to identify the major factors affecting competitiveness and viability before creating a business strategy. These include current influences (strengths and weaknesses) and potential future developments (opportunities and threats) to the business or sector. The intent is to provide the information base to support clear, focused strategy formulation.

Exhibits 35 through 38 provide SWOT matrices for each of the four sectors under consideration: harvesting, aquaculture, processing and marketing, and recreational. Given the diversity within each sector, not every SWOT element is relevant to every industry segment.

10.4.1 Key Fish Harvesting Opportunities

Reform the Capture Salmon Fishery

As the major problem facing the fish harvesting sector, the wild salmon fishery also offers the primary opportunity for reform. The logic for this reform is as follows:

- There is a strong need to get more value from the salmon harvest (and to gain access to the surplus salmon available in many areas of the coast).
- Getting more value requires the delivery of better-quality fish to the processing plant and market.
- Better quality can only be achieved by slowing down the harvest, improving onboard handling, and undertaking shorter fishing trips.
- Harvesters are unlikely to engage in the above activities without a change in DFO fisheries management to give more secure resource allocations through property rights, individual quota, or the like.
- DFO will only change the management structure if there is clear consensus from a majority of salmon licence holders.
- Since there is no effective organization to provide a single voice on the required change, it does not happen.

Consequently, the main priority for the sector is to create a formal salmon harvester association, representing all eight gear and area combinations, and having a duly elected board of directors. Such an organization could be the catalyst and agent of much-needed reform, and could facilitate improved co-management.

Some industry segments view DFO, rather than their own lack of cohesiveness, as the principal barrier to salmon management reform. Whatever the root of the problem, the current development of eight Salmon Area Councils with duly elected boards, and the subsequent launch of a Commercial Salmon Advisory Board, represents a major opportunity.

Improve Security of Tenure

Improved security of tenure for DFO fishing licences, now a limited fishing privilege issued annually, would help harvesters secure their investments and business value, extend the business planning horizon, and facilitate future investment and co-management initiatives. The unfettered discretionary authority vested in the Minister of Fisheries and Oceans, and entrenched in the *Fisheries Act*, is the issue. However, there are models for the Minister to retain statutory authority but delegate administrative responsibility on certain fisheries practices (e.g., the devolution of management responsibility for freshwater fisheries to the Western provinces).

Improve Fish Quality

Although the IQ management system has resulted in substantially better fish quality, there is a need for ongoing improvement as market quality standards escalate. In particular, shorter fishing trips and better on-board handling for IQ fisheries, including bleeding of finfish, are required. Implementing these techniques may require instruction and training.

Exhibit 35: SWOT Analysis – BC Fish Harvesting

Strengths

1. Relatively **healthy fish populations** and natural environment
2. **IQ fisheries** management for many fisheries
3. **Sustainability and co-management success** of several fisheries, e.g., herring
4. Several **"market-driven" fisheries**, e.g., geoduck, groundfish trawl
5. **Near-shore fishery** fleet allows quality fish to be landed
6. **Entrepreneurial spirit**
7. Several strong, **effective industry associations**
8. **Selective fishing** practices
9. World-recognized **dockside/electronic monitoring** and observer programs
10. Fisheries pay **resource access fee** (rent) to Crown

Opportunities

1. Creation of **effective salmon harvester industry** association
2. **Fisheries management changes** to meet market needs, e.g., consistent availability, quality, and price
3. **Greater security of tenure** under fishing licences
4. **Training** with respect to improved onboard handling procedures, bleeding fish, live hauling fish, etc.
5. **Settlement of aboriginal land claims**
6. **Higher quality** and prices
7. **Integrated groundfish fleet management**
8. **Strategic alliances** among harvester groups
9. More **direct sales** to public, more self processing and direct sales in niche markets
10. **Regular reporting** of economic dimensions and importance of industry

Weaknesses

1. **Lack of effective salmon harvester association** /salmon fishery is not "market-driven"
2. **Reluctance** of industry and government **to change** with the times and cooperate
3. **High labour and other costs**, lack of economies of scale due to low production levels, fleet overcapacity
4. **Poor markets** for some species, e.g., pink and chum salmon
5. **Inability to attract crew labour** due to inadequate financial rewards in some fisheries
6. **Fish "left in the water"** because of low prices or a lack of buyer in some cases
7. **Long trip lengths** in some fisheries reduce quality, e.g., halibut
8. **Lack of traceability** back to the vessel and areas where fish are caught
9. **Fish utilization/discards/bycatch issues** in some fisheries
10. **Poor economic data** on the industry

Threats

1. **Potential resource declines** due to oceanographic and climate changes, pollution, and urban encroachment
2. **Aboriginal land claims process** and associated uncertainty
3. Adoption of the **precautionary principle** rather than the precautionary approach to resource management
4. Continued **lack of economic perspective** in resource management decisions
5. **Reduced DFO funding** of science
6. **SARA-imposed restrictions** on fishing opportunities
7. **Environmental opposition** to commercial fishing in BC
8. Public perception of **food safety issues**
9. **Strengthening Canadian dollar**
10. **Lack of public** and community **support** for the commercial fishery

Enhance Fish Quality with Better Traceability

Ultimately, the traceability of harvests back to the vessel and fishing location is likely to be a market requirement. The above changes to salmon management, if they occur, will also enhance traceability and sustainability, by slowing down the harvest and ensuring the necessary labelling of individual vessel production. Traceability requirements will enhance the tracking of different quality fish through the seafood value chain, and will provide the price incentives to meet high-end market needs.

Market Sustainability

Several features of BC's world-leading commercial catch monitoring systems, such as the 100% observer program for groundfish trawlers, could be marketed for export as providing both traceability (i.e., where, when, how, and by whom the fish was harvested) and sustainability (i.e., how it was harvested and what, if any, bycatch and discards resulted). Sustainability potentially confers a marketing advantage.

10.4.2 Key Aquaculture Opportunities

Ensure Timely Regulatory Processes

The major opportunity for the aquaculture sector, both finfish and shellfish, is to have a more efficient and timely regulatory process, especially in the case of federal CEAA reviews. CEAA is a major constraint on aquaculture growth, investment, employment, and viability. The Province could contribute to an improved process through the bulk zoning of broad areas for aquaculture development, with each bulk area undergoing one CEAA process. This would create economies of scale in regulation, lower costs, and reduce timelines for approvals.

Cultivate Whitefish Species

The farming of "whitefish" species, such as halibut and sablefish, offers promise to fill the market gap left by greatly reduced catches of Atlantic cod worldwide. In addition, it can develop new markets in high quality food service (restaurant) businesses.

Inform the Public

Developing and disseminating accurate information on the environmental sustainability of finfish aquaculture is a challenge. The primary concern is the effect of sea cage farming on wild stocks and the marine environment. While admittedly there are some continuing questions, and more research is needed on sea lice and other topics, considerable confusion and misinformation also exists in the minds of consumers and the general public.

Adding to the widespread confusion is a lack of information on the industry's importance to the economy, and to coastal communities and First Nations. Such information would allow environmental concerns to be weighed along with the economic benefits. This information gap needs to be addressed in a coherent manner.

Exhibit 36: SWOT Analysis – BC Aquaculture to Farm Gate

Strengths

1. **Good biophysical growing conditions** for both finfish and shellfish (room for expansion)
2. Relatively **clean water and environment** relative to Lower 48 competitors
3. **Proximity to US market**
4. Consolidation of salmon operations, strong presence by large **multinationals selling food around the world**
5. **Codes of practice** developed by and with the cooperation of industry
6. **Good traceability** (all products flow through federally-registered plants)
7. **Good backward linkages** and forward linkages for most industry supplies and services
8. **"Naturalness" of bivalve shellfish**/health benefits of seafood in general
9. **Strong market demand for clams**
10. **Good quality reputation** of BC cultured finfish and shellfish

Opportunities

1. More efficient and **timely CEAA review process** (new tenures and renewals)
2. **Bulk zoning** of broad areas for aquaculture development
3. **Access to** more lakes **for smolt rearing**
4. Farming of **new "whitefish" species** – halibut, sablefish, cod
5. **Improved productivity**/consolidation from shellfish tenures
6. **Technology transfer** in farming shellfish and farming new finfish species
7. More **coordination of marketing** and deliveries by shellfish producers
8. **New preservation technology** to extend shelf-life – MAP, ozone
9. Increased sales to the domestic Canadian market
10. **Increased capacity** for environmental research and monitoring **in rural BC**

Weaknesses

1. Regulatory delays in CEAA approval process
2. Lack of federal-provincial harmonization of the tenure approval process
3. BC is a **high-cost producer** – high wages, smolt and regulatory costs, lack of economies of scale
4. **Lack of DFO support** to develop new species for aquaculture
5. **Limited technology transfer** in the shellfish sector
6. **Dependence on Canada's East Coast for farm site labour** in salmon
7. **Dependence on Washington State for seed** in shellfish
8. **Lack of water quality monitoring** in **Central and North Coast**
9. **Environmental opposition**, poor public image, mixed public support
10. **Poor** profile and **economic data** on industry

Threats

1. **Real environmental**, disease and product quality **issues** e.g., IHN, Kudoa
2. **Perceived environmental**, disease, and product quality **issues** (attacks by some environmentalists, wild producers, media)
3. **Strengthening Canadian dollar**
4. **Increasing world supply** of low-cost farmed finfish
5. **Feed cost increases** for farmed finfish
6. **Water quality and disease outbreaks**
7. Aboriginal **land claims process** and associated uncertainty
8. Lack of **access to wild broodstock** to culture new species
9. **Lack of technical knowledge** prevents BC from culturing new species
10. **Loss of public** and community **support** for aquaculture

Cooperate More in Shellfish

The farmed shellfish sector has some particular problems related to its small size, fragmentation, and lack of marketing capability. There is realistic potential to significantly multiply production per hectare from existing sites, provided that technology transfer, greater professionalization and diligence, and cooperation among harvesters are fostered. It also appears prudent for the many small growers to work with processors to provide the consistent product volumes, quality, and prices demanded by the market. This requires cooperation within the sector.

10.4.3 Key Seafood Processing and Marketing Opportunities

Meet Consumer Needs

The ability to serve high-quality, high-value seafood market niches requires proper orientation and cooperation by the all the elements in the value chain, from fisheries managers and regulators to harvesters and growers to processors to distributors. Industry must produce the differentiated food products to consistently deliver the product attributes in the supply volumes that consumers want and value. This requires investigating consumer needs, as well as implementing quality and grading standards to instill customer confidence. The ongoing Agriculture and Agri-Food Canada Seafood Value Chain exercise can assist in these areas.

Invest in Capital and Human Resources

A new business model for the BC seafood industry also requires additional investment in plants, equipment, product development, and human resources. These much-needed investments are not being made in the current climate of poor financial returns and viability. In large part, the reason is government regulation and policy at the fish harvesting and farm level, and the considerable uncertainty facing seafood businesses tied to aboriginal land claims issues.

Pursue Quality as the BC Advantage

With production volumes too low and cost structures too high to compete successfully in commodity markets, BC seafood processors need to make quality their competitive advantage. Quality can be the province's advantage on three grounds:

- A clean, cold marine environment ensures the intrinsic quality of our capture and aquaculture raw material.
- The nearshore location of most harvesting and farming operations allows quality raw material, if handled well, to be maintained until reaching the processing plant door.
- BC's strategic geographic location promotes cost-effective access to very large seafood markets in the US (by truck) and Asia (by air).

The market for top quality seafood, especially live and fresh products, is more regional and narrow than the global market for commodity seafood products. That is, the market for quality seafood is less of a commodity business and therefore a market for which BC is better-positioned to compete.

Exhibit 37: SWOT Analysis – BC Seafood Processing

Strengths

1. Consumer **trend to healthy diet/seafood** consumption is growing worldwide
2. **Proximity to US and Asian markets**
3. High quality and **reputation of Canadian fish inspection** system
4. **IQ fisheries management** system produces quality raw material in most cases
5. **BC farmed salmon sites** produce **quality** raw material and deliveries are scheduled to meet market demand
6. Skills and **efficiency of farmed fish processing plants**
7. **Vertical integration of farmed salmon** growout, processing, and marketing operations
8. **Vertical integration of wild salmon, herring, and groundfish operations**
9. Selected **high-quality niche products**, e.g., herring roe, geoducks
10. Top tier **Seafood Alliance industry association**

Opportunities

1. Improved quality raw material if **salmon management changes**
2. **Improving quality, slower more consistent plant volumes** can spur product development, cost savings
3. Produce high **value-added processed niche products**
4. Increased focus on and sales to **domestic Canadian market**
5. Achieving **MSC certification**
6. **New preservation technologies** to extend shelf-life – MAP, ozone
7. Focus on quality and **high-end fresh/live market** to the extent possible
8. **Greater traceability** including tag programs, third party monitoring
9. **Reskilling of workforce** in quality, traceability, marketing
10. **Value Chain Round Table** for seafood

Weaknesses

1. **Inconsistent timing, quality, and price** of some BC raw material, especially salmon
2. BC is a **high cost producer** – wages, environmental regulations, and inspection
3. **Lack of MSC certification** that is important to several European markets
4. Increasing **market power to large distributors**, discounters, and retailers
5. **Aging and low skills** of much of the **wild fish plant workforce**
6. **High cost** of Canadian environmental and fish inspection standards
7. **Small size** of seafood processors/marketers on the world stage
8. **Farmed salmon** is becoming **a commodity**
9. **Lack of cooperation** between wild and farmed seafood sectors
10. Fragility of the capture salmon processing sector

Threats

1. Aboriginal **land claims process** and associated uncertainty
2. Imminent **collapse of the capture salmon processing** industry
3. **Stronger Canadian dollar**
4. **Weak world economies**
5. Increasing **non-tariff trade barriers**
6. **Environmental opposition** to industry – wild and farmed
7. **Failure to reskill** the workforce
8. **Failure to improve traceability and sustainability**
9. **Large** wild **salmon volume from Alaska**/large farmed salmon volumes from **Norway and Chile**
10. **Lack of** community and **public support** for the seafood industry

Attract New Workers

With much of their workforce about to retire, there is an opportunity in traditional capture salmon, herring, and groundfish plants to attract workers who are younger and better educated and skilled. These prospective new workers can continue to learn and embrace the "lifelong learning" culture needed to compete successfully in today's fast-changing food business. To realize this potential requires offering more than seasonal jobs.

Extend the Salmon Season

If, as suggested above, the salmon harvesting industry organizes itself and facilitates change in fisheries management and operating practices, then salmon processors would have somewhat longer operating seasons and much better quality raw material with which to work. They should also be able to achieve plant cost savings, develop new products, and better focus on the market. This is one example of the potential to improve quality and market returns for BC seafood.

Develop the Domestic Market

There appears to be an opportunity for increased BC seafood sales within Canada. Increased domestic sales would not only avoid exchange rate and other risks in the international marketplace, but would likely engender greater public support for the seafood industry in the province.

Investigate New Technologies and Develop Opportunities

Much of the potential in market development, quality improvements, and increased returns exists with fresh and live fish. For these products, the seafood industry should investigate new preservation technologies, such as Modified Atmosphere Packaging (MAP), ozone treatment or flushing, and the sedative aqui-s for live fish shipments. Many of these technologies are approved for use in the US and other countries, but are not accredited in Canada, so industry would need to work with CFIA. Federal and provincial governments should look beyond their traditional regulatory and scientific role, and work with industry on developing opportunities and capabilities to compete in the global food industry.

10.4.4 Key Tidal Recreational Fishery Opportunities

Increase DFO Resources

DFO Pacific Region does not have a formal Recreational Fisheries Division. DFO personnel, including licensing and administrative personnel, devoted to the recreational fishery is estimated to represent at most 10 person-years. In contrast, the Alaska Division of Sport Fish has about 160 permanent full-time employees and an additional 240 seasonal and temporary positions. The predictable result is a lack of DFO attention and resources in the recreational fisheries arena.

Exhibit 38: SWOT Analysis – BC Tidal Recreational Fishing

Strengths

1. Relatively **healthy fish populations**/one of few areas in world with access to wild salmon
2. Relatively **pristine, uncrowded** marine and terrestrial environment/habitat
3. **Variety of experiences** from world class destination lodges to shore-based angling close to urban centres
4. Proximity to US and **cost-effective travel to BC** by air and vehicle
5. DFO policy of **priority access** to anglers **for chinook and coho** salmon
6. **Reasonable** daily and bag **possession** li
7. **Good access** – extensive coastline including an accessible shoreline and network of harbours/marinas
8. **Strong community ties** by anglers through volunteerism, local involvement, and the SFAB process
9. **Growth in shore-based angling**, flyfishing, and angling by women and families
10. Image of **Canada** as a **safe country to visit**

Opportunities

1. **Improved DFO commitment**, staffing, and resources in recreational fisheries management
2. **Improved catch monitoring**
3. Licence fee increases to provide **additional money** targeted at **catch monitoring** and resource management
4. **Enhance stocks** (e.g., Georgia Strait coho) and apply selected fishing (e.g., mark-only harvests)
5. **Public education**, marketing, and infrastructure
6. **Closer links** between recreational **fishing** and broader **Tourism BC** marketing programs
7. Use **2010 Olympics** as a world stage to promote a variety of BC destination activities, including angling
8. Compulsory **logbook program** for **guides and lodges** to promote sustainability and resource management
9. **Strategic alliances** – potential joint ventures with aboriginal groups, packages with non-fishing businesses
10. **Regular reporting** of economic dimensions and importance of the industry

Weaknesses

1. **Lack of DFO attention**/leadership, personnel, and financial resources devoted to the recreational fishery
2. **Inadequate catch monitoring**
3. **Uncertainty** tied to **aboriginal land claims**
4. **Declining resident participation**; take-up by new Canadians and urban residents is low
5. **Lack of knowledge**/education as to **angling opportunities**
6. **Lack of "single window" provincial ministry** to champion and serve the sector and liaise with DFO
7. **Poor government and industry communications** with media/no focal point or organization for media contact
8. **Lack of DFO stock assessment** work on lingcod, rockfish, and other species
9. **Lack of integration** between **recreational fishing** and broader Tourism BC marketing programs
10. **Poor** market and **economic data** on angling and importance of angling to tourism mix

Threats

1. **Potential resource declines** due to oceanographic and climate changes, pollution, and urban encroachment
2. A **preservationist** rather than conservationist (or sustainability) **approach to** resource management
3. **Strengthening Canadian dollar** makes Alaska more price competitive
4. **Attacks on sustainability grounds** due to inadequate catch monitoring
5. Restricted angling opportunities to protect any **SARA**-listed species
6. **Potential** mid-season **regulatory changes** including closures
7. Aboriginal **land claims process** and associated uncertainty
8. Potential **shutdown of salmon hatcheries** due to DFO funding cutbacks
9. **Failure to cultivate** next generation of anglers
10. **Loss of public** and community **support** for angling

Improve Catch Monitoring

One symptom of the lack of DFO resources is the less than adequate catch monitoring system for the BC tidal recreational fishery, especially for non-salmon species. Without credible catch monitoring, negotiating and adhering to formal allocation agreements or targets is extremely challenging. In the absence of improved monitoring, the recreational sector will remain vulnerable to the concerns of other resource users who are subject to more stringent catch monitoring programs. Improving the catch monitoring system is a major opportunity.

One way to fund the necessary improvements in catch monitoring is via increased licence fees ("user pay"), with the additional monies directed towards catch monitoring and resource management initiatives. However, under present federal Treasury Board policy, earmarking any licence fees is difficult.

Cultivate New Anglers

Another important issue facing the sector is the decline or arrested growth in angling participation. To reverse this trend and establish the next generation of resource advocates will require some combination of public education, cooperative marketing programs, and possibly infrastructure development (e.g., public ramps and access, enhancement-based fisheries). In BC, there is a large untapped urban population within a two-hour drive of excellent fishing opportunities. In addition, North America has a growing segment of avid outdoor recreationists and tourists, with substantial disposable income, that can be nurtured as clients for the wide variety of packaged fishing services offered by BC lodges and charters.

In both of these areas, improved catch monitoring and increased angler participation, BC can learn from experience elsewhere, such as Alaska's comprehensive catch reporting system and the "Water Works Wonders" marketing campaign in the lower 48 states.

Enhance Selected Stocks

Another opportunity is the enhancement of certain stocks (e.g., Georgia Strait coho), with a recreational fishery targeted at the enhanced stocks using selective fishing measures (e.g., mark-only fisheries). Increased access to abundant coho resources, particularly in Georgia Strait, would go a long way to slowing or reversing the decline in angling participation.

Promote Angling as a Tourism Activity

The Province could also stimulate the recreational fishery sector through greater integration of angling messages in broad-based tourism promotions by Tourism BC and others. Angling could be promoted as one part of a multi-faceted tourism experience. Furthermore, the 2010 Olympic and Paralympic Winter Games to be held in Vancouver offer a once-in-a-lifetime opportunity to market BC for a variety of outdoor pursuits, including angling.

More generally, greater attention could be devoted to the recreational fishery's economic contribution and potential for growth. The Province can play an important role in influencing DFO decisions and decision-making processes beyond its limited mandate in the tidal recreational fishing area.

10.5 Aboriginal Issues and Opportunities

Address Land Claims and Other Uncertainty

The majority of BC's land base is not subject to treaties and therefore may remain subject to aboriginal rights and/or title. Existing fisheries and aquaculture businesses cite the uncertainty surrounding land claims and AFS processes as a major barrier to long-term planning and investment.

Aboriginal people comprise a significant 20% share of the employment base of the seafood and recreational fisheries sectors in total. These participants suffer from the same uncertainty of rights and continued access/jobs as their non-aboriginal counterparts. On the other hand, land claims settlement should provide greater certainty to existing business as well as increased opportunity for new businesses, both aboriginal and non-aboriginal.

New Aboriginal Business Development Opportunities

Aboriginal people have a strong preference for economic development that conforms to and complements their cultural traditions and identity. Fisheries and aquaculture offer a unique business development opportunity for BC's coastal aboriginal people. In many cases, individuals can tap business and employment opportunities in their home communities, and avoid the need to move to urban centres. This is especially true for shellfish culture opportunities.

The settlement of land claims represents a significant business opportunity. Under settlement, aboriginal people could receive substantial financial support, resources ("fee simple" land, fish allocations, etc.), and other entitlements that could be used to launch seafood and tourism businesses. In addition, under current federal and provincial government policies, many new capture fisheries and aquaculture entities require significant aboriginal consultation, cooperation, and, in some cases, participation.

Nevertheless, significant hurdles exist, not the least being the harsh business realties of the global seafood industry, driven increasingly by economies of scale and trade in seafood raw material and finished products. Business acumen and marketing expertise are essential for this business climate.

Despite the challenges, aboriginal business opportunities do exist. In developing these opportunities, it appears prudent to start small and/or to arrange joint ventures with non-aboriginal interests to bring requisite expertise to the table. A strong business focus is also imperative, along with the creation of a separate business entity other than a Band Council or Band-controlled corporation.

10.6 Final Comment

There are many alternative uses to the ocean environment, including ecotourism, foreshore development, and oil and gas exploration. Without broad public support, the BC seafood and angling sectors could see their continued access to the marine environment diminished or threatened. Moreover, bad news and controversies in one sector can and have had negative spillover market effects. United, the fisheries and aquaculture sectors are stronger and more influential. All sectors should acknowledge one other's legitimacy, realize the commonality of their interests, and work together.

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Appendix A

Data: Fish Harvesting

Exhibit A.1: BC Wild Fish Harvesting Profile 2002 – Preliminary

	Fleet																
Licensing 2002	Salmon	Roe Herring	Spawn-on-kelp	Halibut	Sablefish	GF Trawl	RF Hook & Line	Tuna	Geoduck	Crab	Prawn	Shrimp	Red Urchin	Green Urchin	Sea Cukes	Clams	Other	Total
No. of Licences	2,221	1,523	46	435	48	142	262	n/a	55	222	252	246	110	49	85	1,146	626	7,468
IQ Management?	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	No	No	Yes	Yes	Yes	No	a mix	a mix
Operations 2002																		
No. Active Vessels/Operations	1,700	400	45	214	26	70	200	200	42	212	215	100	46	15	14	900	200	3,000
Average Crew Size inc. Skipper	2.1	4.5	6.5	3.5	6.0	4.0	2.0	2.5	3.2	3.0	3.0	2.0	3.0	3.0	3.0	1.0	2.0	
Weeks Fished Per Operation	8	4	6	4	14	20	10	16	18	24	10	14	25	3	2	8	10	
Employment & Wages 2002																		
Employment PYs	950	240	60	100	75	185	135	265	80	510	215	95	115	5	5	240	135	3,410
Crew wages $ millions	18	6	4	7	3	23	2	8	12	12	7	2	4	0	1	5	1	115
Harvest Tonnes																		
1993	85,000	38,000	270	4,790	4,550	122,600	1,300	490	2,430	6,300	1,210	3,280	6,110	530	870	1,270	10,370	289,370
1994	65,800	36,700	260	4,490	4,530	164,600	1,400	2,000	2,230	6,000	1,310	3,190	5,960	220	600	1,620	7,500	308,410
1995	48,500	24,500	260	4,310	3,710	121,300	1,500	1,720	2,100	4,700	1,330	6,780	6,810	160	590	1,620	8,610	238,500
1996	34,600	20,400	350	4,310	3,170	138,000	1,640	3,730	1,840	4,900	1,720	7,390	6,470	150	660	1,490	7,150	237,970
1997	48,700	29,600	410	5,590	3,890	129,300	1,700	2,580	1,800	3,900	1,790	3,540	7,450	160	630	1,660	3,180	245,880
1998	30,300	30,900	380	5,850	4,160	129,500	1,490	4,360	1,800	3,000	1,730	3,490	6,090	180	750	1,680	5,400	231,060
1999	17,000	26,500	380	5,540	4,210	124,000	1,450	2,890	1,800	2,900	1,460	2,650	5,390	190	950	1,640	5,740	204,690
2000	18,900	27,200	380	4,820	3,600	58,300	1,430	4,820	1,800	2,830	1,750	2,400	5,290	150	1,020	1,600	9,130	145,420
2001	22,900	22,500	430	4,630	2,700	92,900	1,350	5,190	1,820	5,690	2,110	2,400	4,540	140	1,040	1,900	7,650	179,890
2002	33,100	24,600	380	5,450	1,900	98,100	790	5,140	1,820	4,090	1,700	2,000	4,770	120	1,150	2,000	7,200	194,310
Landed Value $ millions																		
1993	205	67	10	30	22	42	3	1	27	19	10	3	5	4	1	3	10	462
1994	260	75	15	37	32	50	4	5	34	26	12	5	8	2	1	4	7	577
1995	90	60	21	34	30	45	5	4	43	24	18	14	12	1	1	4	3	409
1996	100	71	20	34	23	42	6	9	36	23	27	11	13	1	1	4	2	423
1997	110	49	15	42	32	48	7	6	33	29	26	6	12	1	1	3	1	421
1998	54	26	8	31	26	57	6	9	30	21	20	6	10	1	1	5	1	312
1999	26	40	8	39	25	62	5	7	34	22	19	4	9	1	2	5	1	309
2000	50	39	10	43	30	58	6	15	42	20	33	4	9	1	2	5	4	371
2001	33	33	10	37	23	57	7	20	44	37	34	4	8	1	2	6	2	358
2002	57	37	9	48	15	66	5	18	39	28	18	5	8	1	2	6	2	364

Source: GSGislason & Associates Ltd. estimates based on data from DFO and BC MAFF (assumed 30 person-weeks fished = 1 PY).

Exhibit A.2: BC Capture Fishery Wholesale Value

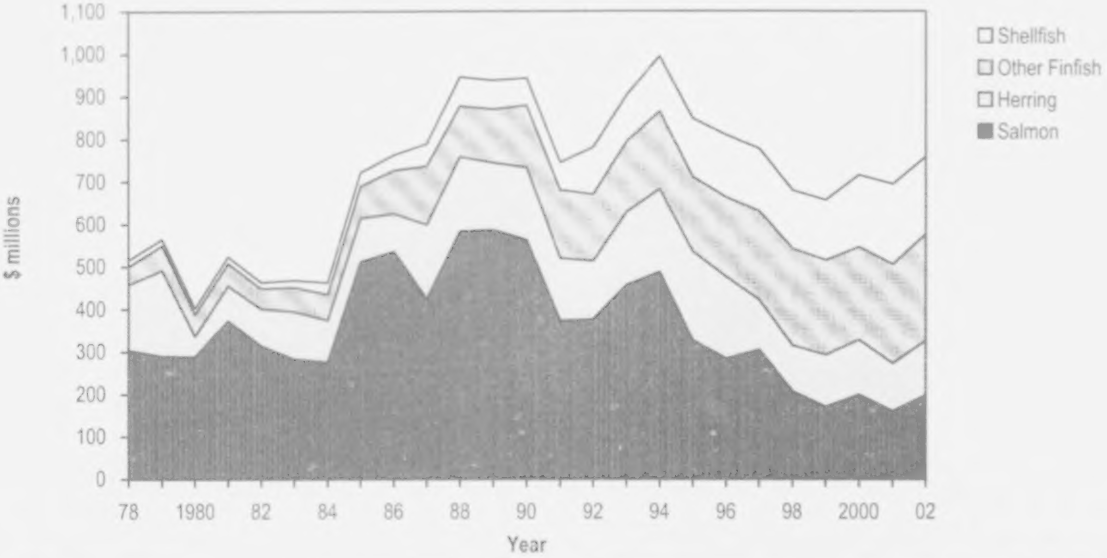


Exhibit A.3: BC Capture Fishery Landed Value

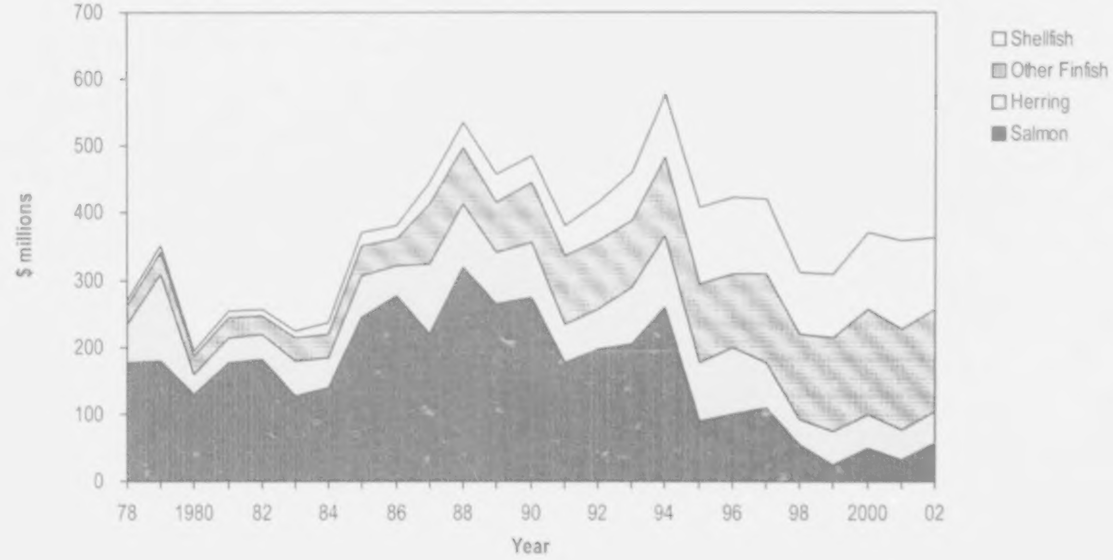
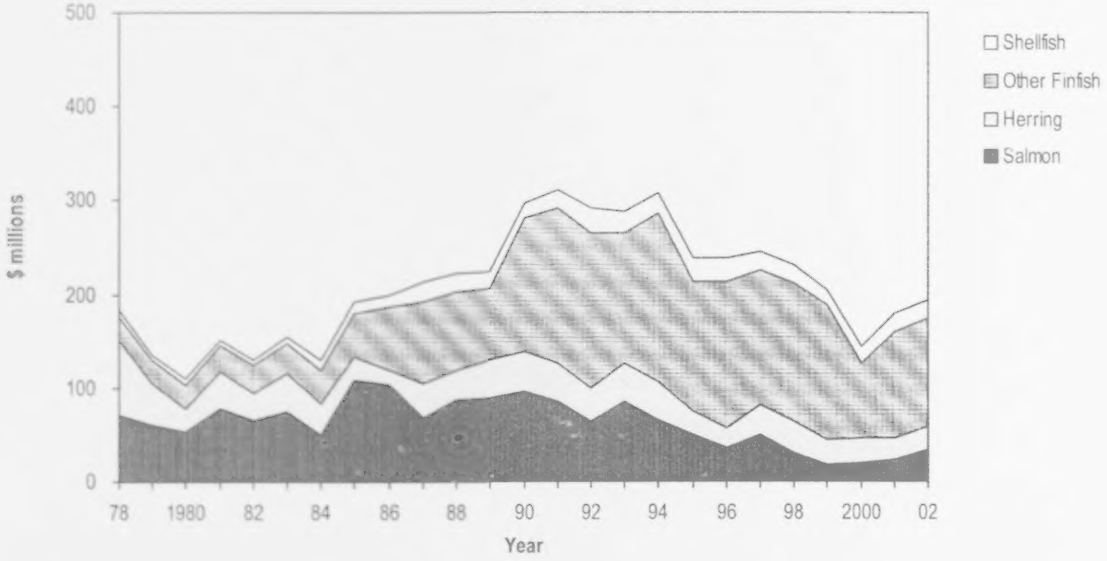


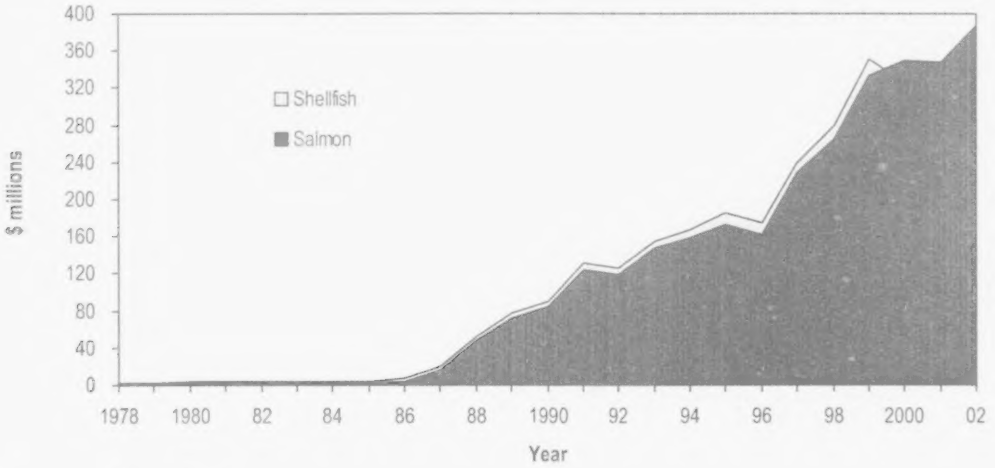
Exhibit A.4: BC Capture Fishery Landings



Appendix B

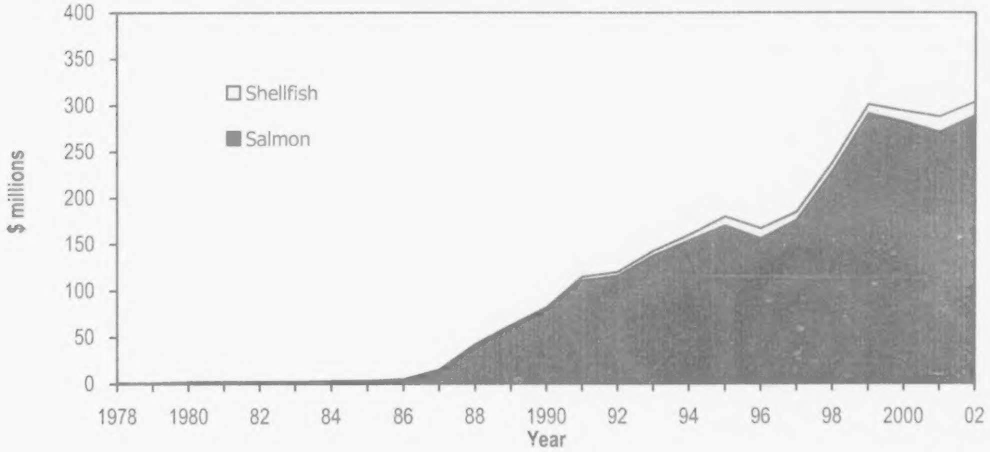
Data: Aquaculture to Farmgate

Exhibit B.1: BC Aquaculture – Wholesale Value



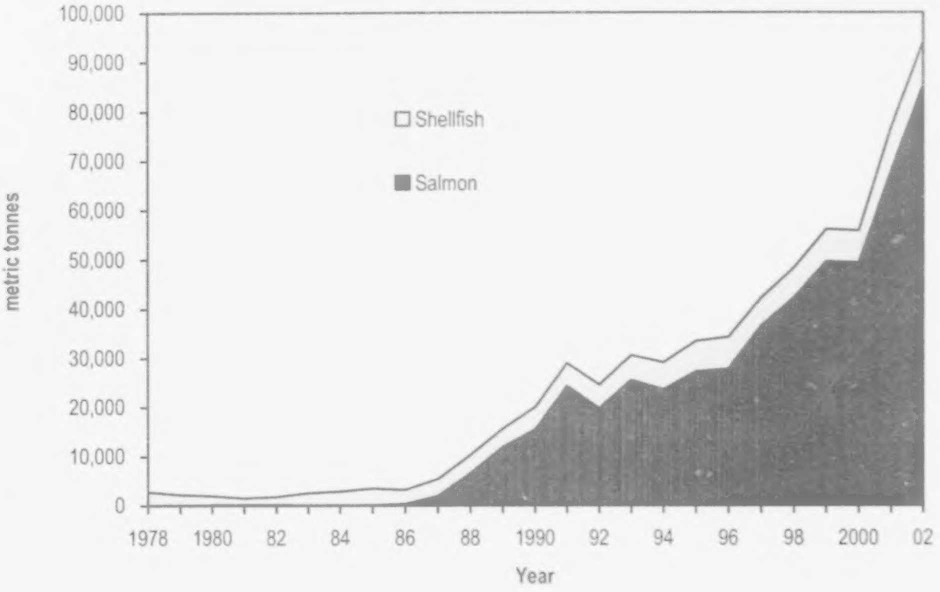
Source: MAFF

Exhibit B.2: BC Aquaculture – Farm Gate Value



Source: MAFF

Exhibit B.3: BC Aquaculture – Production



Source: BC MAFF

Appendix C

Data: Seafood Processing and Distribution

Exhibit C.1: Provincial Processing, Buyer, and Aquaculture Licences

Licensing Category	Number of Licences								
	1994	1995	1996	1997	1998	1999	2000	2001	2002
Processing – Total Licence Issued	212	202	187	184	194	194	190	205	220
Commercial Salmon Cannery Large	7	7	7	7	7	6	7	6	6
Commercial Salmon Cannery Small	4	4	4	3	3	2	2	2	3
Sport Caught Fish	7	4	7	6	8	8	10	10	11
Salmon	113	108	102	98	99	101	98	108	107
Roe Herring	35	31	30	29	26	28	26	29	35
Finfish	85	74	70	66	69	70	71	76	86
Invertebrates	89	83	79	74	77	78	72	76	89
Cold Storage Large	62	59	57	54	52	56	54	59	60
Cold Storage Small	41	39	35	32	37	38	37	40	43
Marine Plants	1	1	2	2	2	4	4	3	8
Trout Only	5	5	4	3	4	4	5	3	4
Non-human Consumption	7	7	8	8	7	7	10	9	9
Buyer - Total Licences Issued	545	521	409	430	346	312	282	269	254
Salmon	289	277	212	222	167	155	128	140	125
Roe Herring	241	214	130	140	93	87	74	74	73
Finfish	95	77	65	70	74	62	60	47	49
Invertebrates	129	119	125	127	121	115	98	96	97
Broker - Total Licences Issued	22	20	16	19	13	13	10	13	8
Salmon	12	14	7	6	6	8	3	7	3
Roe Herring	1	4	2	1	1	1	1	2	2
Finfish	5	12	9	11	7	3	5	6	3
Invertebrates	5	12	7	9	7	3	5	7	6
Fish Vending Licences	364	412	372	481	476	398	334	363	335
Marine Plant Harvesting Licences	44	48	42	48	46	63	65	64	73
Aquaculture Licences									
Finfish Marine	111	126	125	121	120	121	121	121	121
Finfish Hatchery	52	58	53	54	54	54	55	60	59
Shellfish Marine	319	374	387	**420	**430	**432	417	455	455
Shellfish Hatchery	3	3	4	5	7	7			

*** of which 1 is also listed under SF Hatchery*

Source: MAFF

Exhibit C.2: Average Applied Tariffs on Fish and Fish Products

4 digit HS Classification*		Average Applied Tariffs						
		Canada	United States	Japan	China	Korea	Australia	EU
0301	Live Fish	0.0	0.0	2.2	11.7	10.0	0.0	6.8
0302	Fish, fresh or chilled	0.1	0.8	4.8	17.9	20.0	0.0	12.9
0303	Fish, frozen	0.1	0.7	4.4	18.5	10.0	0.0	13.6
0304	Fish fillets and other fish meat	0.0	0.7	4.4	30.0	14.0	0.0	10.2
0305	Fish, fit for human consumption	0.3	1.7	10.4	27.6	20.0	0.0	13.3
0306	Crustaceans	2.7	1.3	3.8	24.0	19.4	0.0	11.0
0307	Molluscs	0.5	0.4	7.4	21.9	18.9	0.0	7.2
0509	Natural sponges of animal origin	0.0	3.0	1.8	15.0	8.0	0.0	2.6
1504	Fats and oils and their fractions, of fish or marine mammals	3.2	0.8	2.3	21.7	3.0	0.0	3.7
1603	Extracts and juices of aquatic invertebrates	4.5	4.3	10.8	25.0	30.0	0.0	6.4
1604	Prepared or preserved fish	5.4	5.2	9.2	25.0	20.0	0.6	18.4
1605	Aquatic invertebrates prepared or preserved	3.2	2.6	7.9	24.4	20.0	0.0	17.6
2301	Aquatic invertebrates, unfit for human consumption	1.0	0.0	0.0	4.0	5.0	0.0	0.0

** World Customs Organisation Harmonised System classification*

Source: OECD, Liberalising Fisheries Markets: Scope and Effects, 2003.

Appendix D

Data: Tidal Recreational Fishery

Exhibit D.1: BC Tidal Waters Sport Fishing Licence Sales and Revenues – Selected Years

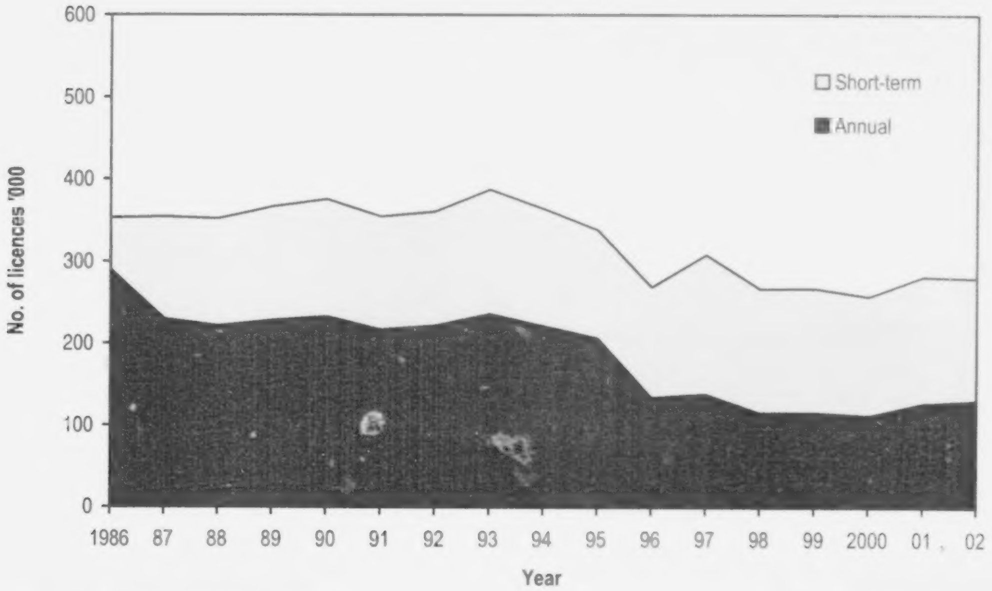
	Fiscal Years			
	1986/87	1991/92	1996/97	2001/02
Licence Type				
Resident*				
Annual	269,498	200,217	130,718	121,958
5 Day	0	0	6,948	10,170
3 Day	0	0	14,510	16,654
1 Day	18,014	41,376	43,604	41,178
Senior	0	24,080	19,190	19,141
Juvenile	0	49,198	50,286	49,692
Subtotal	287,512	314,871	265,256	258,793
Non-Resident				
Annual	20,210	16,250	5,485	5,328
5 Day	3,569	12,564	19,122	22,015
4 Day	4,333	9,493	0	0
3 Day	9,373	14,588	24,331	20,058
2 Day	8,390	14,180	0	0
1 Day	19,673	21,712	32,036	25,656
	0	6,242	6,496	6,017
Subtotal	65,548	95,029	87,470	79,074
Total	353,060	409,900	352,726	337,867
Licence Revenue**	$2,164,000	$4,307,000	$6,977,000	$6,621,000

** Resident of Canada*

*** Includes tags/stamps*

Source: DFO

Exhibit D.2: BC Tidal Waters Sport Fishing Licence Sales to Adults – 1986/87 to 2002/03



Note: Short term is 1 to 5 day licence.

Source: DFO

Exhibit D.3: Georgia Strait Recreational Creel Survey Catch and Effort Estimates, May to September 1980 to 2002

		Catch						
	Boat Trips	Chinook	Coho	Pink	Sockeye	Chum	Rockfish	Lingcod
1980	600,000	220,000	580,000	2,000	0	0	165,000	90,000
1981	508,100	169,200	324,400	50,000	0	0	150,000	100,000
1982	520,300	107,300	398,700	2,800	0	0	165,000	73,200
1983	475,900	146,700	377,100	53,200	0	0	168,900	66,300
1984	562,100	315,900	401,600	9,000	0	0	133,500	121,000
1985	550,000	196,900	670,700	89,800	0	0	116,200	70,900
1986	502,300	146,800	530,300	3,100	900	600	146,900	65,100
1987	506,600	94,400	602,100	89,800	8,500	700	116,600	57,000
1988	570,400	86,300	984,400	8,700	16,300	700	167,500	60,200
1989	515,800	101,400	447,600	122,800	13,300	3,300	170,400	46,000
1990	478,000	86,000	582,000	11,500	42,200	700	137,300	30,500
1991	394,300	98,800	123,600	249,000	23,400	900	144,700	8,000
1992	397,300	92,700	505,300	19,100	6,700	800	121,000	5,700
1993	459,100	109,100	777,100	172,700	23,600	1,800	93,800	6,700
1994	410,900	61,300	273,600	18,500	14,000	300	143,900	6,800
1995	294,300	56,800	73,000	183,900	5,900	1,500	100,600	4,700
1996	280,400	87,900	127,100	7,800	2,400	3,500	99,600	3,700
1997	249,400	53,700	98,500	111,000	16,800	500	83,300	3,900
1998	146,900	18,900	1,800	6,800	4,500	3,600	75,500	3,200
1999	150,800	41,500	300	26,500	500	800	61,600	3,700
2000	148,000	27,200	4,100	9,800	6,400	1,100	48,100	6,100
2001	179,700	44,100	13,200	117,100	3,200	400	59,800	8,600
2002	191,300	66,100	6,300	18,300	5,100	600	26,000	3,700

Notes:

1. *Estimates made for months with missing data in 1980 to 1983 period.*
2. *Catches of other species not listed e.g., greenling, crab.*
3. *Reader should focus on trends as survey procedures are not necessarily consistent over the time period.*
4. *The five months – May through September - generally comprise over 80% of the annual effort and catches of coho, pink, sockeye, rockfish, and lingcod; 70 to 80% of annual chinook catches; but less than half of annual chum catches.*
5. *Catch and effort is boat-based activity only i.e., excludes activity from shore, piers, etc.*

Source: Georgia Strait Creel Survey results plus estimates by GSGislason & Associates Ltd.

Appendix E

BC Stock Assessment

I. Salmon

The 2003 Salmon stock outlook *(http://www.pac.dfo-mpo.gc.ca/ops/fm/Salmon/index.htm)* reviews salmon stock status for 49 stock groupings on a four point scale. 17 of 49 (35%) stock groupings are considered to be of conservation concern or below average status, 23 (47%) stock groupings are considered to be normal or above average status and 9 (18%) are mixed between these categories. The general status of sockeye, coho, chinook, pink and chum salmon species is provided in Chapter 4, Exhibit 1. The stocks of conservation concern are:

South Coast

- Interior Fraser River Coho – The critical status of Thompson River coho stocks was the prime motivation for the 1998/99 coho closures. Escapement improved considerably in 2001 and 2002, but current management objectives are to maintain the Canadian exploitation rate at 3% or less.
- Cultus Lake Sockeye and Late Run Fraser sockeye – There are continuing concerns about high in-river mortality of late run Fraser sockeye and the Cultus Lake stock remains depressed.
- Sakinaw Lake Sockeye – escapement has declined by over 98% over the past three sockeye generations (12 years), mean escapement since 1996 is about 60 fish, in contrast to mean escapements of approximately 5,000 fish from 1955 to 1985.
- West Coast of Vancouver Island Chinook –outlook for returns of wild age 3 fish is poor, outlook for hatchery fish is positive. Lower exploitation rates (11-15%) set to enhance re-building.
- Other stock concerns include interior Fraser steelhead, Okanagan and Nimpkish sockeye, and early Fraser River chinook.
- Inshore Rockfish - bycatch is an issue and, commencing in 2003, salmon fishing (commercial and recreational) is restricted (not permitted) in the designated rockfish conservation areas.

North Coast

- Rivers Inlet and Smith Inlet sockeye – currently under a recovery plan and no fishing opportunities are anticipated in the near future.
- Northern and Central Coast Coho – management goal is to maintain a low exploitation rate (10%) to permit re building of the stock.
- North Coast Chum – many stocks are considered to be depressed and no or reduce fishing opportunity is anticipated for the near future.
- Inshore Rockfish – as per south coast areas.

II. Groundfish

Pacific Cod

- Relatively rapid growth, mature at 3 years, 4 separate stocks, harvested by trawl.
- Stock size at historic low in 1994-96, currently below average recruitment levels, a significant management concern for the BC trawl fleet.
- Harvest restrictions are relatively recent with no quota prior to 1992, area closures for protection of spawning stock.
- stocks are expected to remain at low levels over the short term, but recent evidence of increased recruitment.

Hake

- A schooling, migratory species which spawns off Baja California and migrates north to the west coast of Vancouver Island in the summer. There is a separate resident stock of hake in the Strait of Georgia.

- The largest biomass of fish harvested in British Columbia, formally fished by both Canadian and joint venture fisheries (Canadian vessels landing fish to foreign processing vessels). Since 2002 all hake landings have been on shore to Canadian fish processors.
- Stock assessments are conducted jointly by Canadian and American scientists, however until recently both sides disagreed on quota allocation resulting in overfishing the quota by 10% for over 10 years. In 2003 an agreement was reached on stock assessment, management, and quota allocation of the transboundary hake stock to take effect in 2004. Canada will get 26.12% of the TAC.
- Surveys in 2001 indicate lowest biomass since surveys initiated in 1977 (10% of 1977 levels) however a strong 1999 brood year indicates that rebuilding of the stock.
- Current management concerns include strength of new recruitment and distribution of the stock in Canadian waters.

Sablefish

- Rapid growth but long lived (to over 100 years), fished to depths of 1000m, managed as a single stock in British Columbia.
- Harvested by trap as well as hook and line, managed under IVQ system, highly developed co-management regime with industry funding a significant research component.
- Stock size in BC considered stable but uncertainty as to current level of recruitment resulted in quota reductions since 1999. Generally below average recruitment during the 1990s with stronger year classes in 1997, 1999, 2000.
- Management issues include bycatch, (particularly inshore rockfish but also marine birds on longline gear), integrated fishing plans (sablefish are also caught by the trawl fleet), and strength of recent brood year classes.

Flatfish (Rock, Dover, English and Petrale sole)

- Rock sole stocks are relatively stable but lower than late 1980s due to unfavorable ocean conditions and high harvest levels prior introduction of quotas in 1996.
- Dover sole catches increased significantly in late 1980s as the trawl fishery expanded into deeper water, current stock abundance considered average and fishing quotas likely to remain stable.
- English sole populations reached a 50 year peak in 1997, with more recent declines due to unfavorable ocean conditions.
- Petrale sole (Brill) stock status remain below historic levels, TAC allocated in the trawl IVQ fishery has remained relatively constant since 1996.

Pacific Halibut

- Halibut have been managed internationally since 1923 by Canada and the USA under the International Pacific Halibut Commission (IPHC). IPHC sets total quota, the allocations between countries and conducts stock assessment.
- The halibut fishery is a globally recognized model for international fisheries management and sustainable fishing practices.
- Current stock status is considered above average and will likely remain so for several years, but poor ocean conditions since 1996 indicate the stock size may decrease in the future.
- Current management concerns include bycatch of inshore rockfish, the accuracy of recreational and First Nations catch estimates and seabird bycatch (mandatory seabird bycatch reduction devices were introduced in 2003, after one year of voluntary use).

Shelf and Slope Rockfish

- A group of about 30 rockfish species inhabiting the continental shelf and upper continental slope, harvested by trawl and hook and line fisheries.
- Rockfish are long lived species (some species over 100 years) and population size is determined by relatively few strong year classes. Many species are dominated by early 1980's year classes followed by

a sustained period of low recruitment. Stocks are slow to rebuild as some species do not mature until 20-25 years old.

- Outlook is stable or declining for most species. Stock assessment data is often poor for this complex species group but observer catch data since 1996 has greatly improved the catch and biological information available.
- Thorneyhead rockfish (short and long spined species) have increased in importance to the BC trawl fleet as deeper areas are fished. Recently catch per unit effort has declined and there is uncertainty as to stock size.
- Bocaccio rockfish has recently been listed as Threatened by the Committee of the Status of Endangered wildlife in Canada (COSEWIC).

Inshore Rockfish

- A group of 5 rockfish species generally found at shallower depths than slope and shelf species, usually associated with complex rocky bottoms (i.e. reefs)
- These species are vulnerable to overfishing due to their longevity, territoriality and accessibility.
- All inshore rockfish species are considered at low levels of abundance and Strait of Georgia populations have continued to decline significantly despite measures to limit catch.
- Recently rockfish conservation areas (no recreational, commercial or First Nations harvest) have been implemented to protect and maintain spawning biomass.
- In recent years observer and electronic monitoring programs have improved rockfish catch and discard information in commercial hook and line fisheries (halibut, sablefish and ZN fisheries). Catch information is still considered poor for the recreational fishery.
- The outlook is poor over the short to medium term and catch limits may continue to decrease. Inshore rockfish bycatch remains a significant management issue in hook and line and trawl fisheries

Lingcod

- Important First Nation, recreational and commercial species harvested by trawling and hook and line
- Lingcod are vulnerable to overfishing due to their non-migratory habits, association with distinctive bottom features such as rocky reefs and moderate longevity (to 14 years)
- Strait of Georgia stocks are extremely low and the area is closed to both commercial (since early 1990's) and recreational (since 2002) fishing. Offshore stocks remain at moderate levels but there is no evidence of strong year class recruitment during the 1990's for either St. of Georgia or offshore lingcod stocks.
- The introduction of bycatch limits and effective quota monitoring by on board and dockside observers has, since 1996, reduced targeting on lingcod by the groundfish trawl fleet.
- Current management concerns include development of accurate abundance indices for St. of Georgia stocks, rockfish bycatch by targeted lingcod hook and line fisheries and integrated fishing plans (lingcod are bycatch in several hook and line fisheries, including salmon troll fisheries)

III. Pelagic Fish

Eulachon

- Small, anadromous fish which spawns in about 30 rivers in BC. Eulachon are particularly vulnerable to overfishing and other human activities as there less than 100 spawning rivers on the Pacific coast (Northern California to the Bering Sea).
- An important First Nation fishery, historically there has been a small commercial fishery on the Fraser River.
- Spawning stocks declined dramatically in 1994, particularly in more southern rivers, possibly due to ocean climate conditions. All fishing was closed in 1998.

- Most stocks recovered significantly 2000-03. First Nation and recreational fishery in the Fraser River re-opened in 2003. Central coast stocks remain weak.
- Currently eulachon are listed as "Threatened" by COSEWIC.
- Management issues include bycatch in trawl fisheries, particularly the shrimp trawl fishery, which now mandates use of fish exclusion grates to reduce fish bycatch.

Pacific Herring

- The most important pelagic commercial fishery on the Pacific Coast.
- Stocks collapsed in late 1960's due to overfishing, recovered rapidly and the current roe fishery was initiated in 1972.
- Five fisheries management areas (North Coast, Central Coast, Queen Charlotte Islands, West Coast of Vancouver Island, and the Strait of Georgia).
- The BC herring fishery is considered a model precautionary approach for fisheries management and uses area quotas, a conservative harvest rate (20%), a minimum threshold for spawner biomass in order to open the fishery and pooled fishing effort to ensure that quotas are not exceeded.
- Stock status and outlook varies by management area. Currently St of Georgia, North and Central Coast stocks are strong, WCVI and QCI are uncertain or low. Strait of Georgia stocks are considered to be at historic levels.
- The status of minor spawning stocks is a management concern, particularly in the Strait of Georgia where almost all the spawner biomass is located in a single spawning area.

Pacific Sardine

- Like hake, sardine are a migratory species spawning in southern and Baja California and, under suitable water temperature conditions and population levels, migrate off the west coast of Vancouver Island in summer.
- Stocks collapsed in the 1940's due to both overfishing and changing environmental conditions. Scale data from sediment cores indicate that sardine populations cycle dramatically over a cycles which average about 60 years.
- The Pacific sardine population appears to be recovering to pre-1940s levels, and approximately 10% of the stock migrates into Canadian waters.
- Conservative harvest rates (15%) suggest that approximately 15,000 tonnes could currently be harvested in Canadian waters, this quota is currently not fully utilized.
- Under current climatic conditions the outlook is good but decreases in water temperature could result in greatly reduced number of sardines migrating to Canadian waters. On a sustained basis, large fluctuations in abundance of this species should be expected due to climatic cycling and biological interactions.

Albacore Tuna

- A highly migratory, open ocean species distributed throughout the warmer waters of the Pacific Ocean.
- Canadian vessels participate in coastal (within Canadian or US waters) and high seas albacore fisheries and land about 3% of albacore caught in the Pacific (most being landed by Asian vessels). The Canadian fishery is a troll fishery.
- The fishery is not intensively managed but Canada has catch and effort reporting obligations under agreements with the US and the UN Agreement on Highly Migratory fish stocks.
- Albacore stocks are considered to be relatively high but there is concern about increasing fishing pressure particularly on younger fish (ages 3-5).
- Current management concerns include non-compliance with catch recording requirements, and implementation of the Canada/US Albacore Tuna agreement.

IV. Invertebrates

Geoduck

- Long lived (to 100 years) subtidal clam, with 4 to 12 year time period to recruitment to the fishery.
- 3 year area- rotational fishery, conservative annual harvest rate (1% of estimated biomass), refugia of deeper water, unharvested beds.
- Location and size of geoduck beds are well documented.
- Outlook is stable, fishery is fully exploited unless current enhancement efforts result in significant increases in biomass.
- Management issues include uncertainty associated with biomass estimates, the rapid expansion of sea otters (prey on geoduck), product discards (Hi-grading) and illegal harvest.

Red Sea Urchin

- Occur in discrete beds on rocky substrate, cannot be aged reliably, juveniles are often aggregated under adult urchin spines.
- Area- rotational fishery, conservative annual harvest rate (2-3% of estimated biomass), minimum size limit, location and size of beds are well documented,
- Outlook for stock is stable but fishery is fully exploited.
- Management issues include the need for better biological information (i.e. reliable aging method), the rapid expansion of sea otters which prey on urchins, and improved information on First Nation and recreational harvest.

Giant Sea Cucumber

- Occur on a variety of bottom substrates, cannot be aged but thought to recruit to the fishery at 4 years or more.
- Since 1997 sea cucumbers have been managed using a precautionary approach whereby only 25% of the coast is commercially fished, 25% is designated for experimental fishing and 50% is unfished. This fishing plan will continue until 2007.
- There is currently no stock status concerns under the precautionary approach outlined above, the management plan is designed to address the current lack of biological information for this species.

Intertidal Clams

- Three species are harvested by hand digging, native littleneck clams, butter clams and manila clams. The latter species was accidentally introduced to the coast in the 1930's with Pacific oyster seed and now forms over 80% of the commercial harvest.
- Rapid expansion of licensed harvesters in the late 1980s until licences were limited in 1998. This was the last fishery in BC to move to limited licences and therefore the only fishery with easy entry in the 1990s.
- Managed by area openings and size limit, most of the central and north coasts have been closed to harvesting since 1963 due to lack of PSP testing.
- Stock outlook is stable but overharvesting of specific beds in the Strait of Georgia and west coast of Vancouver Island is a management issue.
- The impact of recently introduced varnish clam on manila clams stocks (they inhabit similar intertidal habitats) is unknown.

V. Dungeness Crab, Prawns, and Shrimp

Dungeness crab and prawns are currently managed using some form of the "Triple S" (size, sex and season) management system rather than quota management. The triple S system is commonly commonly applied to crustacean trap fisheries. The shrimp fishery is managed under area quotas and season. These fisheries experienced a large increase in fishing effort in the late 1980's and early 1990's, in part due to restructuring of the salmon fleet. Licence limitations were imposed in the early 1990s and subsequently trap limitations imposed in the crab and prawn fisheries.

Dungeness Crab

- Currently managed by size limit, non-retention of females and soft shell closures.
- Effort is limited by trap limitations and area designations.
- Stocks are considered to be stable but the fishery is fully exploited and there are continuing concerns about oversubscribed fishing effort.
- Management concerns include handling mortality of soft shelled crab, sea otter predation, need for better catch data for First Nations and recreational fisheries and compliance with trap limits.

Prawns

- A large species of shrimp inhabiting rocky substrate to depths of 500m. Short lived (4 years), maturing at one year of age.
- Managed by season, spawner index (fishery closed when # of berried females exceeds a predetermined threshold) and trap limits.
- Stocks are considered to be stable but the fishery is fully exploited and there are continuing concerns about oversubscribed fishing effort.
- Current management concerns include compliance with trap limits, growth of and lack of catch data for the recreational fishery, illegal harvest.

Shrimp

- Up to seven shrimp species are caught by the BC shrimp trawl fleet, short lived (to 4 years).
- Rapid expansion of fishing effort in mid-1990s primarily due to re-structuring of salmon fleet.
- Managed by area quotas, but no landings validation program except through fishing logs.
- Stocks are considered to be stable but the fishery is fully exploited and there are continuing concerns about oversubscribed fishing effort.
- Current management issues include bycatch reduction (particularly for eulachon and rockfish), fleet overcapacity and lack of abundance survey data.
- Fish exclusion devices are now mandatory on shrimp trawl vessels and have helped address the bycatch issue.

Appendix F

List of Interviews

Exhibit F.1: List of People Interviewed

NAME	AFFILIATION	LOCATION)
	A - Fish Harvesting	
1. Scarfo, Kathy	Area G Troll President	Saltspring Island
2. Hill, Cecil	BC Salmon Marketing Council & Spawn-on-Kelp Operators Assocation	Vancouver
3. Turris, Bruce	Canadian Sablefish Association	Vancouver
4. Carpenter, Bob	Carpenter Fishing Corporation	Nanaimo
5. Anderson, Gene	Chignik Seine Fisherman	Anchorage, AK
6. Hawkshaw, Fred & Linda	Commercial gillnetter	Prince Rupert
7. Nelson, Stu	Deep Sea Trawlers Association	Vancouver
8. Webb, Lloyd	Fishing Vessel Owners Association	Vancouver
9. Rezansoff, Bob	Fishing Vessel Owners Association	Vancouver
10. Cardinall, Dan	Hartley Bay Fisheries	Hartley Bay
11. Walkus, James	James Walkus Fishing Co.	Port Hardy
12. Clayton, Lorne	Live Marine Fish Research Society	Victoria
13. Clement, George	Orange Rough Company	Auckland, NZ
14. Buker, Sandy	Pacific Salmon Harvesters Association	Vancouver
15. Featherstone, Mike	Pacific Urchins Harvesters Association	Whistler
16. Sporer, Chris	PHMA & Pacific Prawn Fisherman's Association	Vancouver
17. Johansen, Gina	Spawn-on-Kelp Operations Association	Vancouver
18. Radosevic, John	UFAWU	Vancouver
19. James, Michelle	Underwater Harvesters Association	Vancouver
20. Callow, Michael	West Coast Green Urchin Harvesters Ass'n	Victoria
	Aquaculture	
1. Walling, Mary Ellen	BC Salmon Farmers Association Executive Director	Campbell River
2. Parker, Pamela	BC Shellfish Growers Association Executive Director	Deep Bay
3. Reid, Keith	BC Shellfish Growers Association President	Deep Bay
4. Rideout, David	Canadian Aquaculture Industry Alliance	Ottawa, ON
5. Mincher, Russell	Challenger Scallop Enhancement Company	Nelson, NZ
6. Brown, Glen	Cooke Aquaculture	Saint John, NB
7. Evans, Spencer	Creative Salmon Company Ltd.	Tofino
8. Rose, Mike	Newfoundland Aquaculture Association Executive Director	St. Johns, NF
9. Waddem, Gary	Heritage Salmon Ltd.	Blacks Harbour, NB
10. Grydeland, Odd	Heritage Salmon Ltd.	Campbell River
11. Riesen, Rob	Heritage Salmon Ltd.	Vancouver
12. Hirtle, Ken	Heritage Salmon Ltd.	Blacks Harbour, NB
13. Taylor, Jack	Office of the Commissioner for Aquaculture Development Executive Director	Ottawa, ON
14. Karreman, Grace	Pacific Marine Vet Services	Nanaimo
15 Blanshard, Brian	Scotian Halibut - General Manager	Clark's Harbour, NS
16. Were, Keith	Skretting Canada	Saint John, NB
17. Stanley, Trevor	Skretting Canada	Saint John, NB
18. Stewart, Neil	Stolt Seafarms	Campbell River
19. Millerd, Don	Bachelor Bay	Vancouver

Exhibit F.1: List of People Interviewed (continued)

B. Seafood Processing & Marketing

1. Yamagishi, Munie	Aero Trading Co.	Vancouver
2. Mirau, Brad	Aero Trading Co.	Prince Rupert
3. Wilkins, Brad	Alaska General Seafoods	Seattle, WA
4. Patterson, Rob	Alpha Processing Plant	Port Hardy
5. Snell, Grant	BC Salmon Marketing Council	Vancouver
6. Burridge, Christina	BC Seafood Alliance	Vancouver
7. Souter, Doug	Canadian Fishing Company	Vancouver
8. Coleman, Tom	Canadian Fishing Company	Prince Rupert
9. Morley, Rob	Canadian Fishing Company	Vancouverqwe3
10. Werseen, Margaret	Canfisco, HR Manager	Vancouver
11. Drew, Ralph	Canfisco	Vancouver
12. Pashley, Dave	Englewood Packing Co.	Port McNeill
13. Romas, Tanya	Englewood Packing Co.	Port McNeill
14. Anstey, Reg	FFAW/CAW	St. Johns, NFLD
15. Gross, Shari	Halibut Association of North America	Seattle, WA
16. Bodner, Paulli	JSMcMillan Fisheries	Vancouver
17. McMillan, Barry	JSMcMillan Fisheries	Vancouver
18. Young, Phil	JSMcMillan Fisheries	Vancouver
19. Masterman, Jack	Keltic Seafoods	Port Hardy
20. Oehling, Johanna	National Seafood Sector Council	Ottawa, ON
21. Chatwin, Murray	Ocean Fisheries	Vancouver
22. Taylor, Greg	Ocean Fisheries	Vancouver
23. Safarik, Edward	Ocean Fisheries	Vancouver
24. Todhunter, Tom	Ocean Fisheries	Vancouver
25. Harmon, Todd	Pacific Seafoods International	Sidney
26. Edwards, Julie	Robert Wholey & Co. Canada Ltd.	Ucluelet
27. Kueber, Terry	Scarlett Point Seafoods	Port Hardy
28. Warren, Patrick	Smokey Bay Seafoods Co. Ltd.	Vancouver
29. Tipton, Blake	SM Products	Vancouver
30. Bourke, Paul	Ucluelet Seafood Products	Victoria
31. Thorkelson, Joy	UFAWU	Prince Rupert
32. Pirie, Bill	Walcan Seafood Ltd.	Quadra Island

C. Recreational Fishing

1. Otway, Bill	BC Wildlife Federation	Vancouver
2. Arbour, Ted & Jason	Campbell River Fishing Lodge	Campbell River
3. Clarkson, Brian	President, Campbell River Tourism	Campbell River
4. Conn, Lorrie	ex-Chamber of Commerce	Parksville
5. Jenkins, Ken	Codfather Charters	Port Hardy
6. Bos, Chris	Family Fishing Society of BC	Victoria
7. Bond, Ward	Island Outfitters	Victoria
8. Mohl, Jason	Jay's Fly & Tackle Clayoquot Adventures	Tofino
9. Maynard, Jeremy	Jeremy Maynard Guiding	Campbell River
10. McCullouch, John	Langara Fishing Lodge	Vancouver
11. Guiguet, Matt	Murphy's Sport Fishing	Port Alberni
12. Hiller, Brian	Naden Lodge	Massett

Exhibit F.1: List of People Interviewed (continued)

C. Recreational Fishing (continued)

13. Wright, Bob	Oak Bay Marine Group	Victoria
14. Paish, Martin	Oak Bay Marine Group	Victoria
15. Young, Bud	Port Hardy Marine Hardware	Port Hardy
16. McCallum, Brent	Redl Sports	Vancouver
17. Murphy, Marilyn	Riverside Bed & Breakfast	Port Alberni
18. Harling, Wayne	Sport Fish Advisory Board	Nanaimo
19. Scott, Gerry	Sport Fish Advisory Board	Courtenay
20. Milligan, Laurie	Sport Fish Advisory Board	Vancouver
21. Franzen, Ken	Sport Fish Advisory Board, North Coast	Prince Rupert
22. Protherone, Tom	Sport Fish Advisory Board, North Coast	Terrace
23. Bird, Tom	Sport Fishing Institute	Vancouver
24. Kristianson, Gerry	Sport Fishing Institute Advisor	Victoria
25. Trayling, Rick	Traylings Tackle Shop	Prince Rupert
26. Egan, Bernie	Vertigo Link Charters	Prince Rupert
27. Close, Dick	Weigh West Marine Resort	Tofino
28. Grange, Rick	West Coast Fishing Club	Vancouver
29. Cuthbert, George	West Coast Resorts	Vancouver
30. Kellett, Wayne	Westwind Tugboat Adventures	Victoria

D. Federal Government

1. Barnett, Jane	Agriculture & AgriFood Canada	Toronto, ON
2. Roy-Foster, JoAnne	Agriculture & AgriFood Canada, Assistant Director, Food Bureau	Ottawa, ON
3. Gould, Warren	Agriculture & AgriFood Canada, Food Bureau	Ottawa, ON
4. Stead, Richard	Agriculture and AgriFood Canada	Ottawa, ON
5. Chan, Preston	Canadian Food Inspection Agency	Vancouver
6. Liem, Sing	Canadian Food Inspection Agency	Vancouver
7. Reid, Lyle	Canadian Food Inspection Agency	Vancouver
8. Sullivan, Judy	Canadian Food Inspection Agency	Vancouver
9. Ridgeway, Laurie	DFO Director General	Ottawa, ON
10. Steward, Julie	DFO Chief Recreational Fishing	Ottawa, ON
11. Forbes, Rod	DFO Acting Director, Policy	Ottawa, ON
12. Dalpe, Richard	DFO Chief, Policy	Ottawa, ON
13. Brickley, Keith	DFO Chief, Statistics	Ottawa, ON
14. Stanfield, Max	DFO Director, Resource Management	Ottawa, ON
15. Foubert, Martin	DFO	Ottawa, ON
16. Ruseski, Gor	DFO	Ottawa, ON
17. Bijsterveld, Lia	DFO	Vancouver
18. Eros, Carole	DFO	Vancouver
19. Fraser, Sandy	DFO	Vancouver
20. Ionson, Burt	DFO	Vancouver
21. Mylchreest, Russell	DFO	Vancouver
22. Radford, Don	DFO	Vancouver
23. Webb, Allison	DFO	Vancouver
24. Wright, Steven	DFO	Vancouver

Exhibit F.1: List of People Interviewed (continued)

		D. Federal Government (continued)	
25.	Saito, Wayne	DFO Recreational Fisheries	Vancouver
26.	Bornhold, Beth	DFO North Coast Division	Prince Rupert
27.	Reagan, Mark	DFO North Coast Division	Prince Rupert
28.	Rekdal, Dave	DFO North Coast Division	Prince Rupert
29.	Rogers, Juanita	DFO North Coast Division	Prince Rupert
30.	Steward, Jim	DFO North Coast Division	Prince Rupert
31.	Fradette, Victor	DFO North Coast Division	Queen Charlotte City
32.	Chalmers, Dennis	DFO South Coast Division	Nanaimo
33.	Gjernes, Terry	DFO South Coast Division	Nanaimo
34.	Hamer, Lorena	DFO South Coast Division	Nanaimo
35.	Heizer, Steve	DFO South Coast Division	Nanaimo
36.	Lawseth, Don	DFO South Coast Division	Nanaimo
37.	Lochbaum, Ed	DFO South Coast Division	Nanaimo
38.	Luedke, Wilf	DFO South Coast Division	Nanaimo
39.	Thomas, Greg	DFO South Coast Division	Nanaimo
40.	Grant, Sue	DFO Fraser River Division	Vancouver
41.	Clarke, Dan	DFO Pacific Biological Station	Nanaimo
42.	McFarlane, Sandy	DFO Pacific Biological Station	Nanaimo
43.	Parry, Ian	DFO Pacific Biological Station	Nanaimo
44.	Burke, Les	DFO Director Fisheries Management	Halifax, NS
45.	Donnelly, Ken	HRDC Aboriginal Relations Office	Ottawa, ON
46.	Sops, Petr	HRDC Assistant Director, Aboriginal Relations	Ottawa, ON
		E. Provincial Government	
1.	Carswell, Baron	BC Ministry of Agriculture, Food and Fisheries	Victoria
2.	Leitz, Peter	BC Ministry of Agriculture, Food and Fisheries	Victoria
3.	Mathews, Carmen	BC Ministry of Agriculture, Food and Fisheries	Victoria
4.	Smith, Dave	BC Ministry of Agriculture, Food and Fisheries	Victoria
5.	South, Nancy	BC Ministry of Sustainable Resource Management	Victoria
6.	Williams, Bob	BC Ministry of Water, Land and Air Protection	Victoria
7.	Hallin, Lillian	BC Stats	Victoria
8.	Proverbs, Trevor	BC Treaty Negotiation Office	Victoria
9.	Williams, Duncan	Land and Water BC	Nanaimo
		F. Regional Government	
1.	Ellwyn, Bill	Alberni-Clayoquot Economic Development Commission	Port Alberni
2.	Koch, Annemarie	Mount Waddington RD	Port McNeill
3.	Rushton, Jim	Prince Rupert Economic Development Commission	Prince Rupert
4.	Plester, Susan	Vancouver Island Economic Developers Association	Maple Bay
5.	Roberts, Rick	Vancouver Island Economic Developers Association	Nanaimo

Exhibit F.1: List of People Interviewed (continued)

G. Other

1. Glavin, Terry	Pacific Marine Conservation Caucus	Vancouver
2. Deleebeeck, Denise	British Columbia Institute of Technology	Vancouver
3. Salter, Blair	Daystar Marketing	Vancouver
4. Van Gills, Peiter	Ecotrust	Vancouver
5. Eidsvik, Odd	Eidsvik & Associates Ltd.	Prince Rupert
6. Kyte, Chris	Food Processors of Canada	Ottawa, ON
7. Greba, Larry	Kitasoo Development Corp.	Klemtu
8. Tillapaugh, Don	Malaspina University College	Nanaimo
9. Jones, Roy Jr.	Pacific Balance Consulting Inc.	Skidegate
10. McDiarmid, Cam	Royal Bank	Duncan
11. Jongeneel, Jack	Royal Bank	Duncan
12. Peterman, Randall	Simon Fraser University	Vancouver
13. Hodge, Tony	T. Hodge & Associates	Montreal, PQ
14. Watts, Richard	Tseshaht Director of Fisheries	Port Alberni
15. Hill, Bob	Tsimshian Tribal Council	Prince Rupert
16. Egan, David	Pricewaterhouse Coopers	Vancouver
17. Bingham, Allen	Alaska Department of Fish and Game	Anchorage, AK
18. Chadwick, Bob	Alaska Department of Fish and Game	Sitka, AK
19. Crane, Ed	Alaska Commercial Fishing & Agriculture Bank	Anchorage, AK
20. Sigurdson, Dora	Alaska Department of Fish and Game	Anchorage, AK
21. Grabicki, Steve	Alaska Quality Seafood	Anchorage, AK
22. Smith, Phil	National Marine Fisheries Service	Juneau, AK